

OAKLAND COUNTY WORKFORCE DEVELOPMENT

SKILLS NEEDS ASSESSMENT PROJECT FINAL REPORT

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IN PARTNERSHIP WITH:

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INTRODUCTION

OVERVIEW OF SKILLS NEEDS ASSESSMENT PROJECT

Through the vision of Oakland County Executive L. Brooks Patterson, the Emerging Sectors® business attraction strategy seeks to capture, develop and implement new and emerging technologies in order to ensure the County continues to thrive as a premier technology hub. In conjunction with this strategy, the 2007 Oakland County Business Roundtable Workforce and Education Committee recommended that the County oversee the development and implementation of a Skills Needs Assessment Checklist to function as a strategic tool within the Emerging Sectors Program for the development and maintenance of a highly skilled workforce. Subsequently, an RFP was issued and the Skills Needs Assessment Project contract was awarded to EdEn Inc., a consulting firm based in Oakland County.

The primary purpose of the Skills Needs Assessment Project (SNAP) was to provide workforce developers and educators with a better understanding of the skills and competencies job seekers need in order to satisfy Emerging Sector workforce demands. To accomplish all goals and objectives while ensuring the efficacy of the initiative, the Skills Needs Assessment Project structure was divided into four distinct phases: Research, Design, Validation, and Implementation.

Current and potential Oakland County Emerging Sector employers were identified as the target audience for completion of specified project components and a source from which critical data was gathered and verified. In addition, individuals representing emerging sector companies, workforce organizations and educational groups were targeted for participation based upon their mutual vested interest in ensuring project success.

These Key Stakeholders served as advisors and consultants to the Project Team and represent a variety of organizations including:

- Workforce Development
- Post-Secondary Education
- K-12 Education
- Intermediate School Districts
- Emerging Sector Companies
- Economic Development Departments
- Employer Associations
- Various Committees

In this capacity, the stakeholders provided valuable input and recommendations, thereby having a significant impact on the ultimate success of this Oakland County initiative.

The Skills Needs Assessment Project and all critical project components were designed based upon independent research as well as input from this cross section of Oakland County stakeholders. Emerging Sector employers were asked to validate the data to ensure the skills and competencies associated with key sector jobs were identified and properly communicated.

The Skills Needs Assessment Project was funded by:

L. Brooks Patterson, Oakland County Executive
Oakland County Workforce Development Board
Michigan Department of Energy, Labor and Economic Growth

Equal Opportunity Programs/Employer
Aids and Auxiliary Services Available to Individuals with Disabilities upon Request
Michigan Relay Center 711 or (800)649-3777, Voice & TDD

EXECUTIVE SUMMARY

Statement of Opportunity

As its foundation, the executive management team of Oakland County, Michigan, has established an approach to governance that is both anticipatory and forward thinking. Therefore, through the vision of Oakland County Executive L. Brooks Patterson, the Emerging Sectors® business attraction strategy seeks to capture, develop and implement new and emerging technologies in order to ensure the County continues to thrive as a premier technology hub. In conjunction with this strategy, the County has organized various Business Roundtable Committees to address particular areas important to both the County and its residents. Specifically, the Oakland County Roundtable Workforce and Education Committee strives to increase development, availability and awareness of educational offerings and job skill development programs.

It was the Workforce and Education Committee that first identified the existence of a widening gap between the expectations of Emerging Sector employers and the capabilities of the Education/Workforce community. The lingering perception behind this divide was that employers were either not confident in, or unaware of, the offerings available to them; and, the education and workforce coalition was not confident in, or unaware of, the specific workforce needs of the employers.

In 2007, the Workforce and Education Committee recommended the County oversee a research project targeted at all Emerging Sector employers. The goal was to develop a Skills Needs Assessment Checklist for each of the top jobs identified by employers within each Emerging Sector. The findings would provide workforce developers and educators with a blueprint of the skills and competencies job seekers need to satisfy workforce demands. The Skills Needs Assessment Project (SNAP) commenced in late first quarter of 2008 and was targeted toward the following Emerging Sectors:

- | | |
|--|-------------------------|
| ▪ Advanced Electronics & Controls | ▪ Financial Services |
| ▪ Advanced Materials & Chemicals | ▪ Homeland Security |
| ▪ Alternative Energy & Power Generation Technology | ▪ Medical Devices |
| ▪ Biotechnology | ▪ Micro/Nanotechnology |
| ▪ Communications and Information Technology | ▪ Robotics & Automation |

The Skills Needs Assessment Project

To accomplish all goals and objectives while ensuring the efficacy of the initiative, the Skills Needs Assessment Project structure was divided into four distinct phases: Research, Design, Validation, and Implementation. All phases were facilitated by the development and launch of a customized website (www.skills-oaklandcounty.com).

The **Research Phase** of the project included the review and analysis of extensive employment, skills, and assessment data available through various information sources at the national, state and regional level. Properly defined industry correlations drawn between these sources provided the ability to drill down into high-growth, high-demand occupations (by job category and then job title) within each industry. Through this analysis, a preliminary list of targeted occupations was developed for each sector based upon projected growth rates coupled with overall occupational demand.

Standardized occupational requirements and skill sets were then further analyzed in order to create a corresponding preliminary skills “checklist” for each of the 74 unduplicated occupations (158 duplicated occupations spanning all sectors). This information served as the foundation for the Design Phase in which the largely nationally based data would be scrutinized, culled and tailored to meet the needs of SNAP survey tool.

The **Design Phase** involved the solicitation of input and direction from **Key Stakeholders** representing a variety of employers and educational institutions. These individual participants were selected based upon their specific potential as “end-users” of the developed checklists coupled with an overall vested interest in ensuring project success. These Key Stakeholders served as advisors and consultants to the Project Team and represent a variety of organizations including:

- Workforce Development
- Post-Secondary Education
- K-12 Education
- Intermediate School Districts
- Emerging Sector Companies
- Economic Development Departments
- Employer Associations
- Various Committees

In this capacity, the stakeholders provided valuable input and recommendations, thereby having a significant impact on the ultimate success of this Oakland County initiative.

A significant portion of the Design Phase effort was accomplished in a “Collaboratory” environment which involves the use of a high-tech, cost effective methods of data collection powered by leading edge decision support technology. Additional input was gathered through personal interviews. In total, input and feedback was obtained from 36 individuals representing a cross section of the stakeholder organizations.

The initial feedback gathered during the Design Phase indicated that a simple “checklist” would not adequately meet the needs of all project stakeholders due to the myriad of different target groups. The initial assumption was that the final product should consist of a Job Profile that could be converted to a “checklist,” if necessary. This foundational change was further validated in the next phase of the project.

The **Validation Phase** included a concerted effort to further enhance and validate the final version of both the data collection survey tool and the initial Job Profile prior to full project implementation. This was accomplished by soliciting input from key stakeholders, additional representatives of industry, and targeted select Emerging Sector companies utilizing a variety of mediums including an on-line discussion forum. The forum allowed the project team to easily increase the number of validation participants as additional qualified candidates were identified. In addition, more conventional methods to include interviews (both in-person and by telephone) and email exchanges were used for those targeted individuals from whom more in-depth input was desired. As a result of this multi-faceted approach, 125 entities were ultimately invited to participate compared to the 60 originally targeted.

Upon receiving adequate stakeholder input and incorporating relevant changes, the project team configured the on-line survey tool for implementation and a “pilot” survey was set in motion. The pilot survey participants consisted of two companies from each emerging sector and were selected based upon initial research, personal knowledge/contacts, and input from Oakland County. The pilot was invaluable in assisting to identify underlying technical problems which were then corrected prior to full implementation. The pilot was then followed by an intensive process through which over 400 survey participants were confirmed from the original list of over 700 target survey companies.

Project Implementation and Survey Outcomes

A customized web-based needs assessment tool was designed and developed to quantify occupational requirements for Emerging Sector companies. Through the use of this tool, SNAP survey results were obtained from 115 of the over 400 invited emerging sector companies and yielded over 20,000 survey question responses. Sufficient data was collected to analyze 9 of the 10 targeted sectors (insufficient responses were received for the micro/nanotechnology sector). The survey resulted in **thirty (30) comprehensive “one-of-a-kind” Job Profiles** specific to Oakland County and custom tailored for the top jobs in each sector based upon statistically valid data received from employers in 9 of the Emerging Sectors.

The Job Profiles are divided into six (6) major sections:

Section 1 - Contains the occupation name and associated SOC code.

Section 2 - Emerging sector name; job ranking within the sector; other reported job titles for this position; and "County Quick Facts" which includes growth, earning and education data specific to Oakland County.

Section 3 – Comprehensive set of occupation specific tasks that apply to the occupation, regardless of sector

Section 4 – Identification of the competencies ranked as most necessary by Oakland County emerging sector companies.

Section 5 - The division of key competencies into major categories including: Tools and Technology, Knowledge, Skills, Abilities, and Attributes. Top competencies appear in bold print.

Section 6 - Related instructional programs

It is anticipated that the unique Job Profiles will provide the various Oakland County Stakeholders with a distinct competitive advantage in the following areas:

- Workforce Developers will be able to use the profiles to both evaluate current and future training programs to ensure that they meet the expectations of employers and to advise and counsel displaced workers on career possibilities
- Educational Institutions will benefit from the profiles in their efforts to evaluate existing programs and develop new curriculums which are anticipatory in nature and meet the needs of employers. Also, the profiles will benefit the career counseling and placement offices in their ongoing efforts to advise and assist students.
- Representatives in the Business Development Offices will be able to refer to the Skills/Competencies section in their efforts to attract new emerging sector business to the County. By doing so, they will demonstrate an in depth awareness of the job requirements that will be needed by the employers based upon extensive research only available to Oakland County.
- Emerging Sector Employers themselves will be able to utilize the Job Profiles as part of their ongoing Human Capital efforts in the way of development of job descriptions, training and development programs, performance management and workforce planning.

While all 30 Job Profiles are contained within this report, it is noteworthy that the top 5 jobs¹ spanning all sectors are:

1. Computer Software Engineers, Applications
2. Computer Support Specialists
3. Computer Programmers
4. Computer and Information Systems Managers
5. Electrical Engineers

Emerging Themes

While the key survey findings are predominantly embodied in the Job Profiles, the following themes were also revealed during the project.

- The top jobs identified across all sectors were consistently technical in nature, requiring a command of a wide variety of job-specific "Tools and Technology." A majority of occupations required an

¹ Based solely upon the number of respondents

education at the bachelor's and/or graduate degree level. There continues to be a strong demand for skills in math and science; however, English language skills also appeared within the top tier of required skill set(s) across all sectors with the exception of one.

- Top skills most frequently cited as necessary were predominantly from the Analytical/Communication and Intrapersonal skill clusters. One interpretation is that the technical skills associated with a given job represent the minimum skill set to complete the tasks associated with the job, but that the Analytical/Communication and Intrapersonal skills are those that distinguish individuals as highly successful within a particular job.
- Intercultural awareness and sensitivity, as well as global languages, emerged as areas of increasing importance and heightened consciousness.
- Stakeholders could make the biggest impact by taking a “back to basics” approach and address the universal need for improvement in the areas of human interaction abilities (people skills), business communication/acumen, and professionalism. Further, there was significant sentiment expressed regarding the critical need for coaching and training in appearance, work ethic and business integrity.
- Employers anticipate the need for engineers to be proficient in more than one area of concentration. Specifically, there is a growing need for engineers with both electrical and mechanical engineering capabilities.

While it is important to note that the project was adversely impacted by the deteriorating business climate in 2008, the survey still yielded statistically valid results sufficient to provide Oakland County with a distinct competitive edge in its efforts to integrate a cohesive economic growth strategy involving educational institutions, workforce developers and government.

How the information is assessed, utilized and implemented for the immediate future and longer term will determine the ultimate success of the Project.

SNAP: PROJECT SUMMARY BY PHASE

PHASE I SUMMARY: RESEARCH

Methodology

The initial comprehensive research study for the Skills Needs Assessment Project included the review and analysis of extensive employment, skills, and assessment data available through various web-based information sources as identified below. Through a very labor-intensive process, the Project Team determined which data was relevant and reliable and subsequently compiled this data in various forms allowing for further manipulation.

As part of the Research Phase, the project team focused on the importance of aligning local, regional, state and federal initiatives in order to provide a comprehensive picture of the job market; however, identifying and analyzing industry parallels was only the first step in defining the jobs and skill sets to be targeted as part of this project. Properly defined industry correlations, between sources such as the Career Voyages High Growth and Emerging Industries, the Bureau of Labor and Statistics, the Oakland County Emerging Sectors and others provided the ability to drill down into high-growth, high-demand occupations (by job category and then job title) within each industry.

Commonalities across emerging sectors were scrutinized as one of the means by which to ensure the efficacy of the Research Phase. Concurrently, specific factors that underlie the projections of industry employment related to the Emerging Sectors industries were considered as a means to better understand the projected changes in industry employment and output. Through this analysis, a preliminary list of targeted occupations was developed for each sector based upon projected growth rates coupled with overall occupational demand.

Standardized occupational requirements and skill sets were then further analyzed in order to create a corresponding preliminary skills “checklist” for each of the 74 unduplicated occupations (158 duplicated occupations spanning all sectors). These checklists were presented to the Oakland County Workforce Development team as part of the initial Research Phase deliverable. The research findings were ultimately used to assist the project team in driving stakeholder consensus. Preliminary research data was presented to the Emerging Sector employers selected for participation in collaborative session(s) as part of the Design Phase.

Data Sources

Department of Labor Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)

Nationally recognized source of career information to include job descriptions, training and education requirements, earning potential, job growth rates, etc.

Career One Stop – Pathways to Career Success (<http://www.careeronestop.org/>)

A clearinghouse for competency models.

Career Voyages (<https://www.careeronestop.org/GetMyFuture/default.aspx>)

A collaboration between the U.S. Department of Labor and the U.S. Department of Education designed to provide information on high growth, in-demand occupations along with the skills and education needed to attain those jobs.

Bureau of Labor and Statistics (www.bls.gov)

Principal fact-finding agency for the Federal Government in the broad field of labor economics and statistics. BLS satisfies a number of criteria, including relevance to current social and economic issues, timeliness in reflecting today's rapidly changing economic conditions, accuracy and consistently high statistical quality, and impartiality.

Oakland County Emerging Sectors (<https://www.oakgov.com/advantageoakland/programs/Pages/emerging-sectors.aspx>)

Industry and technology sectors that have high growth rates in Oakland County

O*NET (<http://online.onetcenter.org/>)

Primary source for national occupational information, providing comprehensive information on key attributes and characteristics of workers and occupations.

Michigan.gov (www.michigan.gov)

Portal for government, economic growth, and labor market information providing valuable links and information from DLEG (<http://www.milmi.org/>), Michigan Works (<http://www.michiganworks.org/>), Michigan Talent Connect (<https://www.mitalent.org/>), and Michigan Jobs and Career Portal.

Data and feedback collected in the Research Phase were continuously enhanced throughout the project based upon additional input from various key stakeholders as documented in the Change Control Document (Appendix E).

The complete and detailed Research Phase deliverable as presented to Oakland County Workforce Development can be found in Appendix A. Preliminary skills checklists for the 74 unduplicated occupations which were initially part of the Research deliverable were not included as part of the final report.

PHASE II SUMMARY: DESIGN

The data obtained at the National level in the Research Phase of the project provided the foundation for the Design Phase which entailed the gathering of information, feedback and expectations from a group consisting of key Project Stakeholders. Key Stakeholders included representatives from the Oakland County Workforce Development Division, the Oakland County Planning and Economic Development Services Division, the Oakland Education Advisory Group, employers in emerging sectors, employer associations, Oakland County Michigan Works! Service Centers, and educators from K-12 school districts, the intermediate school district, and post secondary education institutions. The Design Phase also provided for the opportunity to introduce Key Stakeholders to a website (www.skills-oaklandcounty.com) that had been developed specifically for the project.

The website would evolve throughout the project as the different phases were initiated.

The specific intention going into the Design Phase was to utilize the input obtained in the Research Phase and customize it to accommodate the development of a comprehensive survey tool leading to a Skills Needs Assessment Checklist specific to Emerging Sector employers in Oakland County.

The Stakeholders provided input for consideration by the project team regarding key aspects of the project to include the following:

- Feedback on the data gathered in the research phase
- Expectations of the needs assessment results and the final product.
- Design of the survey tool to include input on content, appearance, usability, functionality and user-friendliness.
- Effective methods of communication to ensure maximum response from the target groups

It was during this phase, coupled with research gathered previously, that it became obvious to the project team that a simple checklist would only meet the specific needs of a certain segment of the Stakeholder group as the Educational Institutions alone had more than one potential user group within each individual organization. Further, the emerging sector employers provided feedback which indicated that, if developed properly, the final product could be extremely beneficial to them as a personnel planning tool. The Project Team had anticipated this possibility through data gathered in the research phase and had developed a prototype Job Profile for the stakeholders to review. The response to the Job Profile was extremely positive and it was determined that the project team would move forward with the intention of developing a Job Profile as a final product that would have the flexibility to be converted as necessary to meet the needs of the specific user.

Data Collection Methodologies

The following two methods were utilized to gather input and feedback during the Design Phase of the project:

Collaboratory Sessions

A significant amount of input was obtained through the use of a “Collaboratory” within Oakland University in Rochester, Michigan. A Collaboratory session is a high-tech, cost effective method of collaborative data collection, coupled with decision support technology. A collaboratory provides an environment in which users can perform their research by having participants interact electronically with colleagues while sharing instrumentation, data and information and virtually, if necessary. Two Collaboratory sessions were held in the Design phase of the project. One session consisted of a group of Stakeholders with representatives from both the Workforce Development and Education community (with all levels, to include K-12 and secondary education, represented). The second session consisted solely of representatives from emerging sector companies. In total, 22 stakeholders participated in the Collaboratory sessions combined.

Interviews to Supplemental Collaboratory Process

Face-to-face and phone interviews were conducted to supplement the data collected in the Collaboratory sessions. The interviews conducted served the dual purpose of collecting additional information and reinforcing the information solicited in the Collaboratory sessions. In total, 15 representatives from 7 educational institutions, 6 emerging sector companies, and 2 professional associations were interviewed.

During the Design Phase there were requests by stakeholders to consider the addition of 4 new occupations and 12 additional occupations remapped to new sectors. In addition, it was determined that the final report should provide not only the skills needed for the 5 key jobs in each sector, but also the following:

- Criticality – how critical is the skill
- Difficulty – how difficult is it to find job candidates who possess this skill
- Frequency – how frequently is the skill performed
- Trainability – can the skill be acquired through training

Throughout the Design Phase, 61 suggestions were logged into a Change Control Document that was developed to track all project recommendations and changes (see Appendix E for complete Change Control Document) and all were reviewed and discussed by the project team. Of those, 31 items were either adopted as is, or moved into the Validation Phase for review.

The Design Phase resulted in the conclusion that the needs assessment survey tool would have to be in an “on-line” format to be effective and a preliminary design was developed utilizing all of the input provided by Stakeholders in the way of content and technical needs. Further, an initial draft of the Job Profile was approved to serve as the template for a final product.

Both would be validated in the next phase.

The complete and detailed Design Phase deliverable as presented to Oakland County Workforce Development can be found in Appendix B.

PHASE III SUMMARY: VALIDATION

Once the preliminary designs were completed for both the recommended Job Profile (in lieu of a Checklist) and the initial data collection survey instrument, a concentrated effort was made to further enhance and, ultimately, to validate the final version of both prior to implementation. This was accomplished by soliciting input from key stakeholders, additional representatives of Industry and targeted select Emerging Sector companies utilizing a variety of methods.

Before a final survey instrument could be developed it was important for the Project Team to accomplish the following three goals prior to implementation:

- Solicit further feedback from Key Stakeholders to enhance and validate the design, structure and content of the Job Profile which would, based upon input from the survey, ultimately serve as the final product.
- Simultaneously solicit feedback from Key Stakeholders on the design and content of the survey instrument as it continued to evolve based upon the input of selected additional representatives from industry.
- Once the survey instrument was designed and configured into an on line format, it would have to be tested through the launch of a “pilot” survey with a select group of emerging sector companies.

Input was gathered through several methods to accommodate the three goals.

Methodology

Phase 1: Review and Enhancement

One of the key tools utilized during the validation phase was an on-line discussion forum. This cutting edge technology served as the most effective way for Stakeholders and invited participants to provide ongoing input and feedback on both the Job Profiles and the evolving Survey Instrument. It also allowed the project team to easily increase the number of validation participants as additional qualified candidates were identified or encountered. As a result, 125 entities were ultimately invited to participate compared to the 60 originally targeted. Individuals were given the opportunity to access a designated secure on-line site via an assigned password, and were also provided with the opportunity to “post” comments and suggestions for other participants to review.

In addition, more conventional methods to include interviews (both in person and by telephone) and email exchanges were used for those targeted individuals from whom more in depth input was desired. This phase provided the project team with the opportunity to further enhance both the Job Profile and the survey instrument so that both contained information specifically important to Oakland County. It was during this phase, for instance, that several improvements were made in the way of the descriptive terminology utilized in the Job Profile, resulting in the development of a “common language” acceptable to all stakeholder groups. It was also during this phase that the need for questions regarding multicultural skills were identified and added to the survey tool.

Phase 2: Further Enhancement and Pilot Survey

Once the project team was satisfied that adequate input had been obtained and relevant changes had been incorporated into the survey tool it was configured for on-line implementation and a “Pilot” survey was set in motion. Two (2) companies were selected from each emerging sector (twenty in total and none that had participated in other phases) to participate based upon initial research, personal knowledge/contacts, and input from Oakland County.

The pilot provided the project team with an opportunity to roll out the survey tool on a limited basis in order to test the communication process, gain input on its effectiveness and usability, and solicit feedback on content. User support was available through a call center to answer questions and provide technical support. The Call Center personnel had direct access to the system developer and content experts of the project.

The feedback from the Pilot effort indicated that the content included within the survey was extremely comprehensive and more than met expectations in order to move forward to full implementation. The Pilot was invaluable in assisting to identify potential problems in some of the technical areas of the survey such as the sign-in procedure, ease of transition from one segment to another, stopping and starting up at another time and the instructions for certain functions. All of the technical issues were addressed prior to implementation.

In total, twenty-five (25) suggestions were received during the Validation Phase, bringing the total number of recommendations to eighty-six (86) for the project through all phases leading up to Implementation. Forty-eight suggestions (56%) were adopted and incorporated into the project (see Change Control Document in Appendix E).

The complete and detailed Validation Phase deliverable as presented to Oakland County Workforce Development can be found in Appendix C.

PHASE IV SUMMARY: IMPLEMENTATION

Based upon input gathered in the Validation Phase from Key Stakeholders and Emerging Sectors Employers, a final On-Line Survey Tool was configured for launch to the entire Emerging Sector community. The Implementation Phase of the project consisted of the following key elements:

Identification of Final Emerging Sector Targets

The Oakland County Emerging Sector website coupled with a contact list supplied by the County Business Development Office provided the sampling frame for the needs assessment survey. After comparing the two lists for duplication, 726 unique companies were identified as potential targets for the survey. Each company with a missing contact name was researched to identify an upper management person within each company.

An introduction letter from County Executive L. Brooks Patterson was sent by U.S. Mail to all of the target companies to both create awareness of the project and to demonstrate that the Project was supported at the highest level of the county administration. The letter was specifically sent to the leaders of each organization indicating that they would be contacted by telephone to identify the appropriate person within their organization to complete the needs assessment.

Next, the critical step of following up on the letter to identify the appropriate contact person within the target organizations was accomplished through a combination of phone calls, mail, and email. It is important to note that over 200 letters had been returned due to outdated/no longer existing addresses or incorrect individuals. The follow-up effort also included an attempt to gain relevant contact information for these companies.

A comprehensive follow-up campaign was undertaken utilizing both a call center from Oakland Community College in Auburn Hills, Michigan and members of the Project Team. Over 2,000 phone calls were made in an effort to personally contact each of the Emerging Sector Companies to identify by name, phone number and email address, the appropriate person within each company to participate in the survey process. Of the companies that were identified as potential survey targets, the intensive follow-up process identified over 400 confirmed candidates. The remainder were eliminated for a variety of reasons to include, but not limited to: refusals to participate, change in location, out-of-business, etc. All of the gathered information was recorded within a participant management database that had been developed.

Survey Implementation and Follow-up

Once the appropriate contact was identified, an email invitation utilizing the web based marketing tool Constant Contacts was developed to invite the identified survey participants to take the survey. Invitees were asked to access the project website and were provided with specific instructions on how to complete the survey.

Once the survey request was sent an ongoing follow-up campaign commenced. While follow-up emails and telephone calls were utilized when necessary, two key approaches served as the cornerstone for the follow-up effort. The Constant Contact email marketing service allowed the project team to track factors such as delivery confirmations, bounce rates, response rates and “click-throughs”. Secondly, at a predetermined date in the implementation phase, an email letter was sent from County Executive L. Brooks Patterson to those that had been unresponsive to that point encouraging them to complete the survey. Throughout the implementation process members of the Technical Support group that was engaged for development of the website and the on-line survey were on-call to address any issues that were encountered by survey respondents. Any necessary assistance, technical or otherwise, requested by participants was handled by telephone or email within 24 hours.

Ultimately, the survey completion deadline was also extended to provide for maximum response. Of the 409 confirmed targets for the survey, there were 115 respondents (28%).

The complete and detailed Implementation Phase deliverable as presented to Oakland County Workforce Development can be found in Appendix D.

SURVEY RESULTS

KEY SURVEY RESULTS

Data analysis revealed three relatively distinct conceptual clusters of skill sets spanning all sectors. These skill clusters are further described below:

<i>Survey Skill Clusters</i>		
<i>Analytical/Communication</i>	▶	<i>Critical Thinking</i> <i>Complex Problem Solving</i> <i>Active Learning</i> <i>Written Expression</i> <i>English Language*</i>
<i>Intrapersonal</i>	▶	<i>Cooperation</i> <i>Dependability</i> <i>Intercultural Sensitivity</i> <i>Intercultural Competence</i>
<i>Knowledge-Based**</i>	▶	<i>Knowledge of Database Platforms</i> <i>Use of Desktop Computers</i> <i>Configuration Management Software</i> <i>Website Development</i>
* Because of the high number of non-native English speakers largely working in the computer and engineering fields; proficiency in English emerged as part of this grouping.		
** The knowledge-based skill set was comprised of skills that are job specific and tied to a specific job task. The example provided is for a technical occupation.		

In examining the top skills across all jobs, within job sectors, or by specific job, the skills most frequently cited as necessary were predominantly from the **Analytical/Communication** and **Intrapersonal** skill clusters. One interpretation is that the technical skills associated with a given job represent the minimum skill set to complete the tasks associated with the job, but that the **Analytical/Communication** and **Intrapersonal** skills are those skills that distinguish individuals that are highly successful within a particular job. Further, these latter skills are less transient in their relative importance. Most of the job specific skills become outdated relatively quickly especially in technical fields; however, the ability to work with others, to think critically, and to express ones' self effectively makes the employee more adaptable to ever changing task requirements and technology and more likely to be successful across industry changes.

The results of the Skills Needs Assessment Project are further validated by the findings of Southeast Michigan's 21st Century Workforce Regional Labor Market Trends & Forecast, issued January 2009. Each commonly studied occupation in the 21st Century Study with a projected growth rate of at least 12% and expectations of 500+ new jobs by 2014, surfaced within the Top 31 weighted jobs in the Oakland County Project; with 3 of the first 4 being the same in a slightly varied order.

Similarly, the “High Demand Skills and Knowledge” identified in the 21st Century Study were identified in one of the four priority tiers in the Oakland County project. It is important to note that the Oakland County ranking of those competencies is significantly different than the Southeast Michigan ranking, indicating that Oakland County has unique skill-set requirements.

Another comparable finding is the importance of both hard and soft skills. In the world of work, “hard skills” are technical or administrative procedures related to an organization’s core business. The Top 10 Jobs in the revealed through the SNAP survey were technical in nature; however, the majority of the skills and competencies rank ordered in terms of importance, frequency, and hard to find in job candidates, were considered “soft skills.” This leads us to believe the future differentiator for business will be the addition and development of “soft skills” – also known as people skills - the non-technical, intangible, personality-specific skills that determine strengths of a leader, team member, listener, negotiator, and conflict mediator, that are necessary to function successfully in this intercultural global environment.

The detailed findings have been further summarized in several categories as documented on the following pages.

TOP JOBS: SPANNING ALL SECTORS

The first analysis conducted was to identify the rankings of jobs by the frequency with which respondents selected an occupation(s) from the list(s) presented on the survey instrument, thereby indicating the perceived demand. These figures were collected regardless of whether the respondent completed any of the individual occupational questions based upon criticality, frequency or importance. Preliminary survey results based solely upon the number of respondents selecting the occupation yielded the Top Jobs presented in Table 1.

TABLE 1: Rank Order of Job Frequencies Based Upon Number of Respondents

Top Jobs	Percent
Computer Software Engineers, Applications	7.6
Computer Support Specialists	6.9
Computer Programmers	5.5
Computer and Information Systems Managers	5.1
Electrical Engineers	4.4
Sales Representatives, Wholesale & Manufacturing, Technical & Scientific Products	3.7
Computer Systems Analysts	3.5
Web Developers	3.4
Chemists	3.2
Network and Computer Systems Administrators	3.2

The second analysis conducted ranked the jobs based upon individual survey inputs (responses) to the associated occupational survey questions. Due to the disproportionate number of respondents represented in the survey across the job sectors, a weighted frequency count was performed to statistically adjust the frequencies, so that each sector's responses were proportionately represented. Table 2 presents the rank order of jobs and the percentage of responses for each job. Rankings are provided for both the weighted and unweighted distributions. It should be noted that even with the adjustment, there was minimal difference in the top 10 jobs. Percentages also indicate a diversity of opinion in job importance with a maximum of selection rate of 14.3%. The top 10 jobs in the weighted analysis represent 63% of total jobs as presented.

Further, in comparing the occupations as identified through the both analyses, the top 4 occupations (or those with the highest perceived demand) are the same; however, the rank order varies slightly indicating a convergent validity in survey responses. The occupations are undeniably technical in nature.

TABLE 2: Rank Order of Job Frequencies Based Upon Number of Responses

Unweighted	Percent	Weighted	Percent
Computer and Information Systems Managers	14.1	Computer and Information Systems Managers	14.3
Computer Software Engineers, Applications	8.4	Computer Software Engineers, Applications	8.8
Computer Support Specialists	7.1	Computer Support Specialists	8.4
Computer Programmers	7.0	Computer Programmers	7.7
Biological Technicians	4.6	Electrical Engineering Technicians	5.1
Accountants	4.0	Accountants	4.7
Chemists	4.0	Biological Technicians	3.9

Electrical Engineering Technicians	3.8	Electrical Engineers	3.5
Sales Representatives, Wholesale & Manufacturing	3.7	Engineering Managers	3.3
Electrical Engineers	3.7	Electrical and Electronics Repairers, Commercial	3.2
Engineering Managers	3.6	Chemists	3.0
Electronics Engineering Technicians	3.3	Personal Financial Advisors	2.9
Personal Financial Advisors	2.4	Tellers	2.7
Chemical Engineers	2.3	Electronics Engineering Technicians	2.6
Tellers	2.3	Network and Computer Systems Administrators	2.3
Electrical and Electronics Repairers, Commercial	2.3	Sales Representatives, Wholesale & Manufact	2.3
Network and Computer Systems Administrators	2.1	Sales Agents, Financial Services	1.9
Sales Agents, Financial Services	1.6	Computer Systems Analysts	1.7
First-Line Supervisors/Managers of Production	1.5	Auditors	1.6
Computer Software Engineers, Systems Software	1.5	Computer Software Engineers, Systems Software	1.5
Computer Systems Analysts	1.5	First-Line Supervisors/Managers of Production	1.4
Auditors	1.3	Industrial Engineers	1.4
Electricians	1.3	Mechanical Engineers	1.2
Pipe Fitters and Steamfitters	1.3	Bookkeeping, Accounting, and Auditing Clerks	1.2
Chemical Technicians	1.3	Electrical Drafters	1.2
Aerospace Engineers	1.2	Team Assemblers	1.1
Electronics Engineers, Except Computer	1.1	Chemical Technicians	1.0
Bookkeeping, Accounting, and Auditing Clerks	1.0	Electricians	.9
Environmental Scientists and Specialists, Inc	1.0	Pipe Fitters and Steamfitters	.9
Electrical Drafters	.8	Chemical Engineers	.9
Team Assemblers	.8	Network Systems and Data Communications Analyst	.8
First-Line Supervisors/Managers of Construction	.7	Environmental Scientists and Specialists, Inc	.7
Network Systems and Data Communications Analyst	.7	Aerospace Engineers	.6
Industrial Engineers	.7	First-Line Supervisors/Managers of Construction	.5
Graphic Designers	.7	Web Developers	.2
Mechanical Engineers	.7	Electronics Engineers, Except Computer	.2
Web Developers	.2	Medical Scientists, Except Epidemiologists	.1
Medical Scientists, Except Epidemiologists	.2	Graphic Designers	.1
Biomedical Engineers	.1	Bill and Account Collectors	.1
Helpers--Production Workers	.1	Biomedical Engineers	.1
Bill and Account Collectors	.1	Helpers--Production Workers	.1
Mechanical Engineering Technicians	.0	Mechanical Engineering Technicians	.1
Surveyors	.0	Surveyors	.0
TOTAL	100	TOTAL	100

TOP JOBS: BY INDIVIDUAL SECTOR

Subsequent analysis was conducted to identify the rank order of jobs by the frequency with which respondents selected the occupation from the sector specific list(s) as presented on the survey instrument. These figures were collected regardless of whether the respondent completed any of the individual occupational questions based upon criticality, frequency or importance. Survey results based solely upon the number of respondents selecting the occupation yielded the results presented in Table 3.

TABLE 3: Rank Order of Job Frequencies Based Upon Number of Respondents by Sector

Top Jobs	Percent
Advanced Electronics & Controls	
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	12
Electrical Engineers	11
Electronics Engineering Technicians	11
Electronics Engineers, Except Computer	11
Industrial Engineers	9
Electrical Engineering Technicians	9
All Other	37
Advanced Materials & Chemicals	
Mechanical Engineers	17
Chemical Engineers	13
Electrical Engineers	13
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	11
Chemists	9
All Other	37
Alternative Energy & Power Generation Technology	
Engineering Managers	23
Chemical Engineers	12
Electricians	12
Environmental Scientists and Specialists	11
First-Line Supervisors/Managers of Construction Trades and Extraction Workers	11
All Other	31
Biotechnology	
Chemists	23
Biological Technicians	17
Chemical Technicians	12
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	11
Medical Scientists, Except Epidemiologists	10
All Other	27

Communications and Information Technology

Computer Software Engineer, Applications	21
Computer & Information Systems Managers	18
Computer Programmers	16
Web Developer	11
Computer Support Specialists	10
All Other	24

Financial Services

Sales Agents	22
Accountants	17
Tellers	15
Auditors	11
Personal Financial Advisors	10
All Other	25

Homeland Security

Computer Support Specialist	20
Computer Programmers	16
Computer Software Engineers, Applications	14
Computer Systems Analyst	11
Network and Computer Systems Administrator	9
All Other	30

Medical Devices

Electronics Engineering Technicians	21
Electrical Engineering Technicians	16
Team Assemblers	16
Electrical Engineers	10
First-Line Supervisors/Managers of Production and Operating Workers	5
All Other	32

Robotics & Automation

Electrical Engineers	19
Electrical Engineering Technicians	9
Mechanical Engineers	9
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	9
Electronics Engineering Technicians	8
All Other	46

TOP SKILLS: SPANNING ALL SECTORS

As a next step in the overall analyses, the skill sets indicated by respondents as related to the jobs which spanned all sectors were ranked (refer to Table 1). Of the total number of potential skills, respondents selected an aggregate of 243 unique skills. Based on the frequency distributions, four tiers of skill sets were identified with Tier 1 being the most frequently cited skills and Tier 4 being the least frequently cited skills. Total frequency (number of individual responses) totaled 20,833 with Tier 1 and Tier 2 skills representing 70% of all skills ranked. Table 4 displays rankings for Tiers 1-3 with the number of respondents selecting a given skill in the columns to the right of the skill type. These rankings were made across all job types for a global assessment of key skills related to future job growth.

TABLE 4: Rank Order of Skills Spanning All Sectors

TIER 1		TIER 2		TIER 3	
Reading Comprehension	474	Self Control	224	Word processing software	127
Critical Thinking	461	Time Management	216	Spreadsheet software	126
Active Learning	453	Achievement/Effort	212	Production and Processing	122
Problem Sensitivity	451	Design	206	Web platform development software	122
Active Listening	444	Stress Tolerance	206	Object/component oriented database	118
English Language	440	Speech Recognition	205	Learning Strategies	116
Attention to Detail	432	Customer and Personal Service	194	Written Expression	116
Dependability	432	Development environment software	189	Technology Design	115
Oral Expression	421	Speaking	172	Notebook computers	110
Mathematics	406	Coordination	164	Economics and Accounting	108
Deductive Reasoning	404	Desktop computers	164	Innovation	108
Oral Comprehension	403	Administration and Management	161	Writing	103
Integrity	397	Leadership	155	Mechanical	101
Cooperation	393	Database mgmt system software	152	Operations Analysis	99
Written Comprehension	377			Programming	89
Inductive Reasoning	375			Instructing	84
Analytical Thinking	370			Clerical	83
Speech Clarity	353			Negotiation	83
Complex Problem Solving	338			Systems Analysis	82
Persistence	338			Computer servers	81
Adaptability/Flexibility	329			Data base user interface	80
Initiative	322			Program testing software	80
Intercultural Awareness	316			Analytical or scientific software	78
Intercultural Sensitivity	313			Systems evaluation	78
Information Ordering	308			Computer aided design	76
Near Vision	298			Telecommunications	76
Intercultural Competence	296			Monitoring	75
Independence	293			Science	74
Computers and Electronics	281			Education and Training	71
Intercultural Intelligence	262			Mathematical Reasoning	71
Judgment and Decision Making	260			Personal computers	71
Engineering and Technology	252			Enterprise resource planning	70
Troubleshooting	243			Equipment Selection	70
				Personnel and Human Resources	68
				Quality Control Analysis	68
				Service Orientation	68
				Personal digital assistant	67

TOP SKILLS: BY INDIVIDUAL SECTOR

After assessing global skill requirements, a series of analyses ranking skill sets by employment sector were conducted. These rankings follow the same format as the global rankings presented in Table 4. Here, the skill sets were split into three tiers based on the frequency ratings for each skill type.

ADVANCED ELECTRONICS & CONTROLS

TABLE 5: Rank Order of Skills across Advanced Electronics & Controls Sector

TIER 1		TIER 2		TIER 3	
Reading Comprehension	50	Object or component oriented database	20	Communicating with Supervisors	10
Oral Comprehension	45	Repairing	20	Documenting/Recording Information	10
English Language	43	Visualization	19	Getting Information	10
Computers and Electronics	42	Computer aided design - CAD	18	Interacting With Computers	10
Oral Expression	42	Equipment Selection	18	Making Decisions and Solving Problems	10
Active Listening	41	Analytical or scientific software	17	Microcontrollers	10
Problem Sensitivity	41	Customer and Personal Service	17	Organizing, Planning, and Prioritizing	10
Active Learning	40	Development environment software	17	Speaking	10
Troubleshooting	40	Electronic measuring probes	17	Identifying Objects, Actions,	9
Speech Clarity	39	Equipment Maintenance	17	Multimeters	9
Deductive Reasoning	38	Physics	17	Program testing software	9
Initiative	37	Spreadsheet software	17	Systems Analysis	9
Mathematics	37	Innovation	16	Voltage or current meters	9
Complex Problem Solving	36	Self Control	16	Word processing software	9
Critical Thinking	36	Speech Recognition	16	Operating system software	8
Inductive Reasoning	36	Coordination	14	Social Perceptiveness	8
Written Comprehension	36	Intercultural Intelligence	14	Writing	8
Dependability	35	Intercultural Awareness	13	Analyzing Data or Information	7
Near Vision	35	Intercultural Competence	13	Counters	7
Engineering and Technology	34	Intercultural Sensitivity	13	Electrical inductance sensors	7
Information Ordering	34	Operation Monitoring	13	Mathematical Reasoning	7
Production and Processing	33	Repairing and Maintaining Electronics	13	Notebook computers	7
Attention to Detail	32	Technology Design	13	Personal computers	7
Integrity	32	Leadership	12	Sales and Marketing	7
Time Management	32	Administration and Management	11	Selective Attention	7
Judgment and Decision Making	30	Database user interface	11	Arm-Hand Steadiness	6
Analytical Thinking	28	Inspecting Equipment, Structures	11	Category Flexibility	6
Mechanical	28	Microprocessors	11	Enterprise resource planning	6
Adaptability/Flexibility	26	Monitoring	11	Instructing	6
Cooperation	26	Telecommunications	11	Office suite software	6
Design	26	Written Expression	11	Signal generators	6
Stress Tolerance	26			Soldering irons or guns	6
Achievement/Effort	23			Soldering or desoldering	6
Persistence	23				
Independence	22				

ADVANCED MATERIALS & CHEMICALS

TABLE 6: Rank Order of Skills across Advanced Materials & Chemicals Sector

TIER 1		TIER 2		TIER 3	
English Language	24	Design	15	Data base user interface and queries	8
Active Listening	23	Engineering and Technology	15	Development environment software	8
Reading Comprehension	23	Intercultural Competence	15	Object or component oriented d	8
Active Learning	22	Mathematics	15	Personal computers	8
Computers and Electronics	21	Complex Problem Solving	14	Program testing software	8
Oral Comprehension	19	Intercultural Intelligence	14	Cooperation	7
Oral Expression	19	Intercultural Sensitivity	14	Customer and Personal Service	7
Problem Sensitivity	19	Notebook computers	14	Judgment and Decision Making	7
Speech Clarity	19	Speaking	14	Negotiation	7
Written Comprehension	19	Attention to Detail	13	Personal digital assistant PDA	7
Critical Thinking	18	Independence	13	Persuasion	7
Near Vision	18	Persistence	13	Presentation software	7
Time Management	18	Adaptability/Flexibility	12	Sales and Marketing	7
Intercultural Awareness	17	Desktop computers	12	Service Orientation	7
Deductive Reasoning	16	Analytical Thinking	10	Social Perceptiveness	7
Dependability	16	Production and Processing	10	Technology Design	7
Inductive Reasoning	16	Spreadsheet software	10	Word processing software	7
Initiative	16	Troubleshooting	10	Writing	7
Integrity	16	Innovation	9	Category Flexibility	6
		Self Control	9	Chemistry	6
		Speech Recognition	9	Information Ordering	6
		Stress Tolerance	9	Science	6
		Written Expression	9		

ALTERNATIVE ENERGY AND POWER GENERATION TECHNOLOGY

TABLE 7: Rank Order of Skills across Alternative Energy & Power Generation Technology Sector

TIER 1		TIER 2		TIER 3	
Persistence	48	Administration and Management	25	Operations Analysis	10
Integrity	45	Coordination	25	Screwdrivers	10
Mathematics	43	Intercultural Intelligence	25	Arm-Hand Steadiness	9
Active Listening	42	Initiative	24	Calendar and scheduling software	9
Dependability	41	Design	23	Computer aided design	9
Deductive Reasoning	40	Complex Problem Solving	22	Speaking	9
Attention to Detail	39	Mechanical	22	Science	8
Cooperation	38	Information Ordering	20	Welders	8
Critical Thinking	38	Independence	19	Written Expression	8
Active Learning	37	Leadership	19	Computers and Electronics	7
Problem Sensitivity	37	Public Safety and Security	18	Power grinders	7
Inductive Reasoning	36	Troubleshooting	17	Taps or dies	7
Adaptability/Flexibility	35	Equipment Selection	15	Trunk Strength	7
Intercultural Competence	34	Repairing	15	Visualization	7
Reading Comprehension	34	Building and Construction	14	Analytical or scientific software	6
Customer and Personal Service	33	Instructing	14	Extent Flexibility	6
English Language	32	Project management software	14	Finger Dexterity	6
Judgment and Decision Making	32	Written Comprehension	14	Notebook computers	6
Stress Tolerance	32	Achievement/Effort	13	Personal computers	6
Intercultural Sensitivity	31	Innovation	13	Personal digital assistant PDA	6
Near Vision	30	Speech Recognition	13	Configuration management software	5
Speech Clarity	30	Desktop computers	12	Hard disk arrays	5
Analytical Thinking	29	Installation	12	Levels	5
Oral Expression	29	Manual Dexterity	12	Personnel and Human Resources	5
Self Control	29	Word processing software	12		
Engineering and Technology	28	Physics	11		
Intercultural Awareness	28	Writing	11		
Oral Comprehension	28				
Time Management	28				

BIOTECHNOLOGY

TABLE 8: Rank Order of Skills across Biotechnology Sector

TIER 1		TIER 2		TIER 3	
Quality Control Analysis	56	Information Ordering	35	Speech Recognition	19
Active Listening	55	English Language	33	Complex Problem Solving	18
Science	53	Graphics or photo imaging soft	32	Bench top centrifuges	16
Time Management	51	Near Vision	32	Inverted microscopes	16
Deductive Reasoning	48	Data base user interface and queries	31	Spectrometers	15
Reading Comprehension	48	Microplate readers	31	Manual or electronic hematology	14
Written Comprehension	48	Persistence	31		
Active Learning	46	Category Flexibility	30		
Problem Sensitivity	46	Chemistry	27		
Speaking	46	Critical Thinking	27		
Oral Comprehension	45	Inductive Reasoning	27		
Spreadsheet software	45	Writing	25		
Mathematics	44	Instructing	24		
Oral Expression	43	Adaptability/Flexibility	23		
Word processing software	43	Intercultural Intelligence	23		
Dependability	42	Learning Strategies	23		
Initiative	42	Self Control	22		
Analytical Thinking	41	Temperature cycling chambers o	22		
Attention to Detail	40	Analytical or scientific software	21		
Integrity	40	Selective Attention	21		
Intercultural Competence	40	Speech Clarity	21		
Cooperation	39				
Intercultural Awareness	39				
Independence	38				
Intercultural Sensitivity	38				

COMMUNICATIONS & INFORMATION TECHNOLOGY

TABLE 9: Rank Order of Skills across Communications & Information Technology Sector

TIER 1		TIER 2		TIER 3	
Critical Thinking	158	Integrity	113	Computer servers	74
Complex Problem Solving	157	Mathematics	108	Initiative	74
Active Learning	145	Web platform development software	107	Leadership	73
Analytical Thinking	142	Intercultural Competence	104	Speech Recognition	70
Attention to Detail	141	Independence	103	Administration and Management	69
Dependability	139	Information Ordering	102	Coordination	69
English Language	138	Intercultural Sensitivity	102	Programming	67
Problem Sensitivity	137	Intercultural Awareness	100	Negotiation	65
Cooperation	134	Judgment and Decision Making	97	Self Control	64
Reading Comprehension	134	Computers and Electronics	95	Near Vision	63
Data base management system software	133	Speech Clarity	95	Systems Evaluation	63
Adaptability/Flexibility	131	Intercultural Intelligence	93	Object or component oriented databases	60
Inductive Reasoning	124	Engineering and Technology	83	Technology Design	60
Development environment software	123	Troubleshooting	82	Achievement/Effort	59
Oral Expression	123			Education and Training	58
Persistence	123			Design	57
Deductive Reasoning	121			Operations Analysis	57
Active Listening	120			Management of Financial Resources	53
Oral Comprehension	119			Economics and Accounting	49
Written Comprehension	118			Desktop computers	48
				Personnel and Human Resources	48
				Clerical	47
				Program testing software	47
				Systems Analysis	42
				Enterprise resource planning	41
				Access servers	39
				Customer relationship management	37
				Stress Tolerance	32
				Learning Strategies	30
				Innovation	29
				Peripheral controller cards	26
				Telecommunications	26
				Network interface cards	25
				High end computer servers	23
				Notebook computers	23
				Written Expression	23

FINANCIAL SERVICES

TABLE 10: Rank Order of Skills across Financial Services Technology Sector

TIER 1		TIER 2		TIER 3	
Customer and Personal Service	70	Speaking	42	Number Facility	30
English Language	69	Deductive Reasoning	41	Service Orientation	30
Attention to Detail	64	Analytical Thinking	40	Clerical	29
Speech Clarity	64	Time Management	40	Spreadsheet software	28
Critical Thinking	63	Oral Comprehension	39	Coordination	27
Dependability	63	Speech Recognition	39	Near Vision	27
Oral Expression	63	Personal computers	37	Information Ordering	25
Reading Comprehension	63	Financial analysis software	36	Persistence	24
Active Listening	62	Intercultural Competence	35	Electronic mail software	22
Problem Sensitivity	62	Intercultural Intelligence	35	Leadership	22
Stress Tolerance	61	Mathematical Reasoning	35	Accounting software	21
Integrity	60	Monitoring	35	Compliance software	21
Economics and Accounting	59	Adaptability/Flexibility	34	Law and Government	20
Desktop computers	55	Word processing software	34	Written Expression	20
Active Learning	54	Initiative	33	Personal digital assistant PDA	18
Cooperation	54	Notebook computers	33	Sales and Marketing	18
Intercultural Awareness	54			Administration and Management	17
Intercultural Sensitivity	53			Computers and Electronics	16
Mathematics	53			Enterprise resource planning	15
Independence	52			Events	15
Written Comprehension	50			Social Perceptiveness	15
Self Control	48			Calculators or accessories	13
Inductive Reasoning	47			Check endorsing machines	13
Achievement/Effort	46			Alarm systems	12
Judgment and Decision Making	46			Concern for Others	12
				Management of Financial Resources	12
				Multi function printers	12
				Presentation software	12
				Social Orientation	12
				Writing	12

HOMELAND SECURITY

TABLE 11: Rank Order of Skills across Homeland Security Sector

TIER 1		TIER 2		TIER 3	
Critical Thinking	52	Persistence	32	Production and Processing	18
Reading Comprehension	51	Learning Strategies	31	Configuration management software	17
Troubleshooting	51	Adaptability/Flexibility	30	Development environment software	17
Complex Problem Solving	49	Integrity	29	Achievement/Effort	16
Mathematics	48	Intercultural Awareness	27	Web platform development software	15
English Language	45	Customer and Personal Service	26	Notebook computers	14
Problem Sensitivity	44	Intercultural Sensitivity	26	Stress Tolerance	14
Active Learning	43	Speech Recognition	25	Program testing software	13
Oral Expression	43	Independence	24	Administration and Management	12
Inductive Reasoning	42	Intercultural Intelligence	23	Personal digital assistant PDA	12
Information Ordering	40	Technology Design	23	Concern for Others	11
Oral Comprehension	40	Telecommunications	23	Judgment and Decision Making	11
Speech Clarity	40	Intercultural Competence	22	Written Expression	11
Attention to Detail	39	Operations Analysis	22	Systems Analysis	10
Written Comprehension	39	Instructing	21	Psychology	9
Cooperation	37	Desktop computers	20	Computer servers	7
Active Listening	36	Database management system	19	Innovation	7
Initiative	36	Object or component oriented database	19	Service Orientation	7
Analytical Thinking	35	Programming	19	Backup or archival software	6
Dependability	34	Speaking	19	Education and Training	6
Design	34	Writing	19	Floppy disks	6
Computers and Electronics	33			Hard disk arrays	6
Deductive Reasoning	33			High end computer servers	6
Engineering and Technology	33			Operating system software	6
Near Vision	33			Power meters	6

MEDICAL DEVICES

TABLE 12: Rank Order of Skills across Medical Devices Sector

TIER 1		TIER 2		TIER 3	
Oral Comprehension	14	Critical Thinking	7	Adaptability/Flexibility	4
Deductive Reasoning	13	Equipment Maintenance	7	Concern for Others	4
Equipment Selection	13	Intercultural Awareness	7	Control Precision	4
Near Vision	13	Leadership	7	Coordination	4
Oral Expression	13	Persistence	7	Independence	4
Problem Sensitivity	13	Analytical Thinking	6	Instructing	4
Computer aided design CAD software	12	Design	6	Speech Clarity	4
Data base user interface and queries	12	Development environment software	6	Analyzing Data or Information	3
Production and Processing	12	Information Ordering	6	Communicating with Supervisors	3
Reading Comprehension	12	Innovation	6	Complex Problem Solving	3
Spreadsheet software	12	Intercultural Sensitivity	6	Documenting/Recording Information	3
Analytical or scientific software	11	Microprocessors	6	Getting Information	3
Attention to Detail	11	Monitoring	6	Identifying Objects, Actions,	3
Cooperation	11	Multimeters	6	Inspecting Equipment, Structure	3
Dependability	11	Operation Monitoring	6	Interacting With Computers	3
Initiative	11	Power drills	6	Judgment and Decision Making	3
Active Listening	10	Public Safety and Security	6	Making Decisions and Solving Problems	3
Arm-Hand Steadiness	10	Written Expression	6	Manual Dexterity	3
Computers and Electronics	10	Intercultural Competence	5	Office suite software	3
English Language	10	Intercultural Intelligence	5	Organizing, Planning, and Prioritizing	3
Finger Dexterity	10	Self Control	5	Quality Control Analysis	3
Inductive Reasoning	10			Repairing and Maintaining Electrical equipment	3
Integrity	10			Rivet tools	3
Mechanical	10			Soldering irons or guns	3
Written Comprehension	10			Specialty wrenches	3
Achievement/Effort	9			Time Management	3
Active Learning	9			Torque wrenches	3
Electronic measuring probes	9			Tube bending machinery	3
Engineering and Technology	9			Visualization	3
Learning Strategies	9			Voltage or current meters	3
Mathematics	9			Word processing software	3
Repairing	9			Workshop presses	3
Soldering or desoldering	9			Administration and Management	1
				Customer and Personal Service	1

ROBOTICS & AUTOMATION

TABLE 13: Rank Order of Skills across Robotics & Automation Sector

TIER 1		TIER 2		TIER 3	
Critical Thinking	51	Inductive Reasoning	29	Repairing	19
Active Learning	49	Persistence	29	Speaking	19
Active Listening	49	Computer aided design CAD	27	Development environment software	18
Reading Comprehension	48	Adaptability/Flexibility	26	Independence	18
Computers and Electronics	46	Intercultural Awareness	26	Administration and Management	17
Deductive Reasoning	46	Mechanical	26	Coordination	16
Attention to Detail	45	Time Management	26	Innovation	16
Oral Comprehension	45	Intercultural Intelligence	25	Leadership	16
Integrity	44	Intercultural Sensitivity	25	Word processing software	16
Problem Sensitivity	44	Stress Tolerance	24	Analytical or scientific software	15
Dependability	43	Achievement/Effort	23	Physics	14
Oral Expression	43	Intercultural Competence	23	Visualization	14
Initiative	41	Judgment and Decision Making	23	Learning Strategies	13
Engineering and Technology	40	Self Control	23	Microcontrollers	13
Cooperation	39			Written Expression	13
Near Vision	39			Voltage or current meters	12
Design	38			Writing	12
Mathematics	38			Mathematical Reasoning	11
Speech Clarity	38			Object or component oriented	11
English Language	35				
Information Ordering	35				
Written Comprehension	35				
Analytical Thinking	34				
Production and Processing	34				
Troubleshooting	34				
Complex Problem Solving	33				

JOB PROFILES

The end result of the Skills Needs Assessment Survey is 30 customized occupational profiles. The profiles contain information specific to emerging sector companies in Oakland County. It is important to understand the contents of each profile. Below is a step-by-step explanation.

ACCOUNTANTS		13-2011.01
EMERGING SECTOR RANKING: #2 in Financial Services		
OCCUPATION DESCRIPTION	Analyze financial information and prepare financial reports to determine or maintain record of assets, liabilities, profit and loss, tax liability, or other financial activities within an organization.	COUNTY QUICK FACTS
OTHER REPORTED JOB TITLES	Staff Accountant, Certified Public Accountant (CPA), General Accountant, Accounting Manager, Business Analyst, Cost Accountant	Oakland County Growth Rate 08-18: 11.74% County Occupational Growth: 780 07 Median Hourly Earnings: \$28.93 Education Level: Bachelor's degree
TASKS		
☐ Prepare, examine, or analyze accounting records, financial statements, or other financial reports to assess accuracy, completeness, and conformance to reporting and procedural standards. ☐ Compute taxes owed and prepare tax returns, ensuring compliance with payment, reporting or other tax requirements. ☐ Analyze business operations, trends, costs, revenues, financial commitments, and obligations, to project future revenues and expenses or to provide advice. ☐ Report to management regarding the finances of establishment. ☐ Establish tables of accounts and assign entries to proper accounts. ☐ Develop, maintain, and analyze budgets, preparing periodic reports that compare budgeted costs to actual costs. ☐ Develop, implement, modify, and document recordkeeping and accounting systems, making use of current computer technology. ☐ Prepare forms and manuals for accounting and bookkeeping personnel, and direct their work activities. ☐ Survey operations to ascertain accounting needs and to recommend, develop, or maintain solutions to business and financial problems. ☐ Advise management about issues such as resource utilization, tax strategies, and the assumptions underlying budget forecasts.		
TOP COMPETENCIES FOR ACCOUNTANTS		
Customer and Personal Service	Active Learning	Active Listening
	Coordination	Critical Thinking
	Economics and Accounting	English Language
	Judgment and Decision Making	Reading Comprehension
TOOLS AND TECHNOLOGY		
Tools used in this occupation:		
☐ Desktop computers ☐ Notebook computers ☐ Personal computers ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA ☐ Tablet computers		
Technology used in this occupation:		
☐ Financial analysis software — Auditware software; Carlisle Magnitude iAnalysis; Fixed-assets depreciation software; MethodWare ProAudit Advisor ☐ Accounting software — Best MIP Fund Accounting; Inuit QuickBooks; Sage CPA Client Checkbook; Sage CPA Practice Manager ☐ Compliance software — ACOUCert software; Intrax ProcedureNet; Paisley Cardmap; Tax compliance property tax management software ☐ Enterprise resource planning ERP software — Acon Systems Corporate Performance Management; Microsoft Great Plains Solomon; Practice management software PMS; Sage Software Platinum for Windows PFIW ☐ Tax preparation software — CCH ProSystem fx TAX; Sync Essentials Trade Accountant; Thomson GoSystem Tax; Universal Tax Systems TaxWise		
KNOWLEDGE		
☐ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction. ☐ Economics and Accounting — Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data. ☐ English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar. ☐ Clerical — Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology. ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications. ☐ Law and Government — Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process. ☐ Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems. ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.		

1. Occupation Name and SOC Code
2. **Emerging Sector Ranking:** How the occupation ranked and in which sector.
3. **Occupational Description and Other Reported Job Titles:** Standardized federal occupation specific information.
4. **County Quick Facts:** Growth, Earning, and Education data specific to Oakland County using Fall 2008 EMSI data projections.
5. **Tasks** detail a comprehensive set of occupation specific elements that apply to a single occupation.
6. **Top Competencies Bar** identifies the areas ranked as most necessary by Oakland County Emerging Sector companies. When appropriate, those competencies which statistically ranked higher in frequency were colored orange.
7. **Tools and Technology** provides information on machines, equipment, tools, and software that workers may use for optimal functioning in a high performance workplace. Items are ordered by frequency of survey responses.
8. **Knowledge** represents the acquisition of facts and principles about a domain of information. Items are ordered by frequency of survey responses. Bolded items are "top competencies" and can be found on the Top Competencies Bar.

NOTE: Content under each profile subtopic has been minimized to allow for a condensed explanation of the Job Profile. Specific profile content may be illegible within the context of this visual representation only. Complete job profiles appear in their entirety in the following pages.

SKILLS

- ❑ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ❑ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ❑ Coordination — Adjusting actions in relation to others' actions.
- ❑ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ❑ Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ❑ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ❑ Mathematics — Using mathematics to solve problems.
- ❑ Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ❑ Systems Analysis — Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- ❑ Systems Evaluation — Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.

9. **Skills** represent developed capacities that facilitate learning or the more rapid acquisition of knowledge. *Content Skills* are background structures needed to work with and acquire more specific skills in a variety of different domains while *Process Skills* are procedures that contribute to the more rapid acquisition of knowledge and skills across a variety of domains.

Items are ordered by frequency of survey responses. Bolded items are "top skills" and can be found on the Top Skills Bar.

ABILITIES

- ❑ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ❑ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ❑ Intercultural Awareness — The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ❑ Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem.
- ❑ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ❑ Speech Clarity — The ability to speak clearly so others can understand you.
- ❑ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ❑ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ❑ Intercultural Sensitivity — The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ❑ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ❑ Intercultural Competence — The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ❑ Intercultural Intelligence — The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ❑ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ❑ Written Expression — The ability to communicate information and ideas in writing so others will understand.

10. **Abilities** represent enduring attributes of the individual that influence performance. Items are ordered by frequency of survey responses.

ATTRIBUTES

- ❑ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ❑ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ❑ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ❑ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ❑ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ❑ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ❑ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ❑ Integrity — Job requires being honest and ethical.
- ❑ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ❑ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

11. **Attributes** represents personal characteristics or work styles that can affect how well someone performs a job. Items are ordered by frequency of survey responses.

RELATED INSTRUCTIONAL PROGRAMS

- ❑ Accounting
- ❑ Accounting and Business Management
- ❑ Accounting and Computer Science
- ❑ Accounting and Finance
- ❑ Auditing
- ❑ Taxation

12. **Related Instructional Programs** represents degree or certificate programs associated with this occupation. Education level can be found in the green "County Quick Facts" section at the top of this profile.

NOTE: Content under each profile subtopic has been minimized to allow for a tabular explanation format of the Job Profile. Specific profile content may be illegible within the context of this visual representation only. Complete job profiles appear in their entirety in the following pages.

ACCOUNTANTS

13-2011.01

EMERGING SECTOR RANKING: #2 in Financial Services

OCCUPATION DESCRIPTION	Analyze financial information and prepare financial reports to determine or maintain record of assets, liabilities, profit and loss, tax liability, or other financial activities within an organization.
OTHER REPORTED JOB TITLES	Staff Accountant, Certified Public Accountant (CPA), General Accountant, Accounting Manager, Business Analyst, Cost Accountant

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	11.74%
County Occupational Growth:	780
07 Median Hourly Earnings:	\$28.93
Education Level:	Bachelor's degree

TASKS

- ☐ Prepare, examine, or analyze accounting records, financial statements, or other financial reports to assess accuracy, completeness, and conformance to reporting and procedural standards.
- ☐ Compute taxes owed and prepare tax returns, ensuring compliance with payment, reporting or other tax requirements.
- ☐ Analyze business operations, trends, costs, revenues, financial commitments, and obligations, to project future revenues and expenses or to provide advice.
- ☐ Report to management regarding the finances of establishment.
- ☐ Establish tables of accounts and assign entries to proper accounts.
- ☐ Develop, maintain, and analyze budgets, preparing periodic reports that compare budgeted costs to actual costs.
- ☐ Develop, implement, modify, and document recordkeeping and accounting systems, making use of current computer technology.
- ☐ Prepare forms and manuals for accounting and bookkeeping personnel, and direct their work activities.
- ☐ Survey operations to ascertain accounting needs and to recommend, develop, or maintain solutions to business and financial problems.
- ☐ Advise management about issues such as resource utilization, tax strategies, and the assumptions underlying budget forecasts.

TOP COMPETENCIES FOR ACCOUNTANTS

Customer and Personal Service	Active Learning	Active Listening	Coordination	Critical Thinking	Economics and Accounting	English Language	Judgment and Decision Making	Reading Comprehension
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Desktop computers
- ☐ Notebook computers
- ☐ Personal computers
- ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA
- ☐ Tablet computers

Technology used in this occupation:

- ☐ Financial analysis software — AuditWare software; Cartesis Magnitude iAnalysis; Fixed-assets depreciation software; MethodWare ProAudit Advisor
- ☐ Accounting software — Best MIP Fund Accounting; Intuit QuickBooks; Sage CPAClient Checkbook; Sage CPAPractice Manager
- ☐ Compliance software — ACCUCert software; Intrax ProcedureNet; Paisley Cardmap; Tax compliance property tax management software
- ☐ Enterprise resource planning ERP software — AcomSystems Corporate Performance Management; Microsoft Great Plains Solomon; Practice management software PMS; Sage Software Platinum for Windows PFW
- ☐ Tax preparation software — CCH ProSystem fx TAX; Sync Essentials Trade Accountant; Thomson GoSystem Tax; Universal Tax Systems TaxWise

KNOWLEDGE

- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Economics and Accounting** — Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Clerical** — Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Law and Government** — Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political

process.

- ☐ Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.
- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ Mathematics — Using mathematics to solve problems.
- ☐ Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ☐ Systems Analysis — Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- ☐ Systems Evaluation — Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Written Expression — The ability to communicate information and ideas in writing so others will understand.

ATTRIBUTES

- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- | | |
|---|---|
| ☐ Accounting | ☐ Accounting and Finance |
| ☐ Accounting and Business/Management | ☐ Auditing |
| ☐ Accounting and Computer Science | ☐ Taxation |

AUDITORS

13-2011.02

EMERGING SECTOR RANKING: #4 in Financial Services

OCCUPATION DESCRIPTION	Examine and analyze accounting records to determine financial status of establishment and prepare financial reports concerning operating procedures.
OTHER REPORTED JOB TITLES	Auditor, Internal Auditor, Auditor-in-Charge, Assurance Manager, Assurance Senior, Financial Auditor, Revenue Tax Specialist

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	11.74%
County Occupational Growth:	780
07 Median Hourly Earnings:	\$28.93
Education Level:	Bachelor's degree

TASKS

- ☐ Collect and analyze data to detect deficient controls, duplicated effort, extravagance, fraud, or non-compliance with laws, regulations, and management policies.
- ☐ Report to management about asset utilization and audit results, and recommend changes in operations and financial activities.
- ☐ Prepare detailed reports on audit findings.
- ☐ Review data about material assets, net worth, liabilities, capital stock, surplus, income, and expenditures.
- ☐ Inspect account books and accounting systems for efficiency, effectiveness, and use of accepted accounting procedures to record transactions.
- ☐ Examine and evaluate financial and information systems, recommending controls to ensure system reliability and data integrity.
- ☐ Supervise auditing of establishments, and determine scope of investigation required.
- ☐ Prepare, analyze, and verify annual reports, financial statements, and other records, using accepted accounting and statistical procedures to assess financial condition and facilitate financial planning.
- ☐ Confer with company officials about financial and regulatory matters.
- ☐ Inspect cash on hand, notes receivable and payable, negotiable securities, and canceled checks to confirm records are accurate.

TOP COMPETENCIES FOR AUDITORS

Active Learning	Active Listening	Administration and Management	Coordination	Critical Thinking	Economics and Accounting	English Language	Judgment and Decision Making	Mathematics	Reading Comprehension	Speaking	Time Management	Writing
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Notebook computers
- ☐ Desktop computers
- ☐ Personal computers
- ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA
- ☐ Tablet computers

Technology used in this occupation:

- ☐ Financial analysis software — AuditWare software; MethodWare ProAudit Advisor; Thomson PPC e-Tools Suite; Tropics software
- ☐ Spreadsheet software — Microsoft Excel
- ☐ Compliance software — Intrax ProcedureNet; Lumigent Integra; Paisley Cardmap; TrendTracker Compliance Solution
- ☐ Data base user interface and query software — Microsoft Access
- ☐ Time accounting software — WorkForce Software EmpCenter Time and Attendance

KNOWLEDGE

- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Economics and Accounting** — Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Writing** — Communicating effectively in writing as appropriate for the needs of the audience.

ABILITIES

- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Mathematical Reasoning** — The ability to choose the right mathematical methods or formulas to solve a problem.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Number Facility** — The ability to add, subtract, multiply, or divide quickly and correctly.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.

ATTRIBUTES

- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Leadership** — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Accounting
- ☐ Accounting and Business/Management
- ☐ Accounting and Computer Science
- ☐ Accounting and Finance
- ☐ Auditing
- ☐ Taxation

BIOLOGICAL TECHNICIANS

19-4021.00

EMERGING SECTOR RANKING: #2 Biotechnology

OCCUPATION DESCRIPTION	Assist biological and medical scientists in laboratories. Set up, operate, and maintain laboratory instruments and equipment, monitor experiments, make observations, and calculate and record results. May analyze organic substances, such as blood, food, and drugs.
OTHER REPORTED JOB TITLES	Biological Technician, Laboratory Technician, Biological Science Laboratory Technician, Environmental Technician, Research Assistant, Research Associate, Resource Biologist, Wildlife Technician, Biological Science Technician, Biological Scientist

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	27.56%
County Occupational Growth:	29
07 Median Hourly Earnings:	\$16.69
Education Level:	Bachelor's degree

TASKS

- ☐ Keep detailed logs of all work-related activities.
- ☐ Monitor laboratory work to ensure compliance with set standards.
- ☐ Isolate, identify and prepare specimens for examination.
- ☐ Use computers, computer-interfaced equipment, robotics or high-technology industrial applications to perform work duties.
- ☐ Conduct research or assist in the conduct of research, including the collection of information and samples, such as blood, water, soil, plants and animals.
- ☐ Set up, adjust, calibrate, clean, maintain, and troubleshoot laboratory and field equipment.
- ☐ Provide technical support and services for scientists and engineers working in fields such as agriculture, environmental science, resource management, biology, and health sciences.
- ☐ Clean, maintain and prepare supplies and work areas.
- ☐ Participate in the research, development, or manufacturing of medicinal and pharmaceutical preparations.
- ☐ Conduct standardized biological, microbiological or biochemical tests and laboratory analyses to evaluate the quantity or quality of physical or chemical substances in food or other products

TOP COMPETENCIES FOR BIOLOGICAL TECHNICIANS

Active Listening	Quality Control Analysis	Reading Comprehension	Speaking	Instructing	Learning Strategies	Mathematics	Science	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Microplate readers — Automated microplate ELISA readers
- ☐ Robotic or automated liquid handling systems — Automatic pipettors; Liquid handling robots; Robotic laboratory equipment
- ☐ Temperature cycling chambers or thermal cyclers — Polymerase chain reaction PCR machines; Polymerase chain reaction PCR thermocyclers
- ☐ Inverted microscopes — Light/tissue culture microscopes
- ☐ Manual or electronic hematology differential cell counters — Automated cell counters; Flow cytometers; Hematology cell counters

Technology used in this occupation:

- ☐ Spreadsheet software — IBM Lotus 1-2-3; Microsoft Excel
- ☐ Word processing software — Corel WordPerfect; Microsoft Word
- ☐ Data base user interface and query software — Database software; Microsoft Access; Thomson EndNote
- ☐ Graphics or photo imaging software — Adobe Photoshop; Graphic software; Harvard Graphics software
- ☐ Analytical or scientific software — SAS software; Statistical analysis software; Systat software; Systat Table Curve

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Quality Control Analysis** — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Instructing** — Teaching others how to do something.
- ☐ **Learning Strategies** — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
- ☐ **Mathematics** — Using mathematics to solve problems.

- ☐ **Science** — Using scientific rules and methods to solve problems.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.

ABILITIES

- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Selective Attention** — The ability to concentrate on a task over a period of time without being distracted.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Category Flexibility** — The ability to generate or use different sets of rules for combining or grouping things in different ways.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Self Control** — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ **Biology Technician/Biotechnology Laboratory Technician**

CHEMICAL ENGINEERS

17-2041.00

EMERGING SECTOR RANKING: #2 in Advanced Materials and Chemicals
#2 in Alternative Energy and Power Generation Technology

OCCUPATION DESCRIPTION	Design chemical plant equipment and devise processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergents, cement, paper, and pulp, by applying principles and technology of chemistry, physics, and engineering.
OTHER REPORTED JOB TITLES	Process Engineer, Chemical Engineer, Engineer, Scientist, Project Engineer, Development Engineer, Engineering Scientist, Process Control Engineer, Process Development Engineer, Refinery Process Engineer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	20.84%
County Occupational Growth:	46
07 Median Hourly Earnings:	\$39.53
Education Level:	Bachelor's degree

TASKS

- ☐ Perform tests throughout stages of production to determine degree of control over variables, including temperature, density, specific gravity, and pressure.
- ☐ Develop safety procedures to be employed by workers operating equipment or working in close proximity to on-going chemical reactions.
- ☐ Determine most effective arrangement of operations such as mixing, crushing, heat transfer, distillation, and drying.
- ☐ Prepare estimate of production costs and production progress reports for management.
- ☐ Direct activities of workers who operate or who are engaged in constructing and improving absorption, evaporation, or electromagnetic equipment.
- ☐ Perform laboratory studies of steps in manufacture of new product and test proposed process in small scale operation such as a pilot plant.
- ☐ Develop processes to separate components of liquids or gases or generate electrical currents using controlled chemical processes.
- ☐ Conduct research to develop new and improved chemical manufacturing processes.
- ☐ Design measurement and control systems for chemical plants based on data collected in laboratory experiments and in pilot plant operations.
- ☐ Design and plan layout of equipment.

TOP COMPETENCIES FOR CHEMICAL ENGINEERS

Active Learning	Active Listening	Complex Problem Solving	Critical Thinking	Engineering and Technology	English Language	Mathematics	Production and Processing	Reading Comprehension	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Microcontrollers — Programmable logic controllers PLC
- ☐ Laboratory mixers — Benchtop mixers; Mixing tanks; Powder mixing equipment
- ☐ Freezedryers or lyophilizers — Lyophilizers
- ☐ Heat exchangers
- ☐ Vacuum pumps

Technology used in this occupation:

- ☐ Spreadsheet software — Microsoft Excel
- ☐ Analytical or scientific software — Laboratory information management system LIMS software; SoftLab PHEdesign; Statistical software; Thermal Analysis Systems The Energy Analyst
- ☐ Data base user interface and query software — Chempute Software E-Notebook; G&P Engineering Software PhysProps; Microsoft Access; Relational database software
- ☐ Object or component oriented development software — C++; Microsoft Visual C# .NET
- ☐ Computer aided design CAD software — CD-adapco STAR-CAD; SolidWorks CAD

KNOWLEDGE

- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Production and Processing** — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ☐ **Chemistry** — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
- ☐ **Physics** — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and

mechanical, electrical, atomic and sub- atomic structures and processes.

- ☐ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ Science — Using scientific rules and methods to solve problems.
- ☐ Technology Design — Generating or adapting equipment and technology to serve user needs.
- ☐ Writing — Communicating effectively in writing as appropriate for the needs of the audience.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Category Flexibility — The ability to generate or use different sets of rules for combining or grouping things in different ways.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.

ATTRIBUTES

- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Innovation — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Leadership — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ Persistence — Job requires persistence in the face of obstacles.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Chemical Engineering

CHEMICAL TECHNICIANS

19-4031.00

EMERGING SECTOR RANKING: #3 in Biotechnology

OCCUPATION DESCRIPTION	Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids, and gaseous materials for purposes, such as research and development of new products or processes, quality control, maintenance of environmental standards, and other work involving experimental, theoretical, or practical application of chemistry and related sciences.
OTHER REPORTED JOB TITLES	Laboratory Technician (Lab Tech), Research Technician, Laboratory Tester (Lab Tester), Research and Development Technician, Chemical Technician, Formulation Technician, Laboratory Analyst (Lab Analyst), Research Associate

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	17%
County Occupational Growth:	54
07 Median Hourly Earnings:	\$22.20
Education Level:	Associate's degree

TASKS

- ☐ Monitor product quality to ensure compliance to standards and specifications.
- ☐ Set up and conduct chemical experiments, tests, and analyses using techniques such as chromatography, spectroscopy, physical and chemical separation techniques, and microscopy.
- ☐ Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids, and gaseous materials.
- ☐ Compile and interpret results of tests and analyses.
- ☐ Provide technical support and assistance to chemists and engineers.
- ☐ Prepare chemical solutions for products and processes following standardized formulas, or create experimental formulas.
- ☐ Maintain, clean, and sterilize laboratory instruments and equipment.
- ☐ Write technical reports or prepare graphs and charts to document experimental results.
- ☐ Order and inventory materials to maintain supplies.
- ☐ Develop and conduct programs of sampling and analysis to maintain quality standards of raw materials, chemical intermediates, and products.

TOP COMPETENCIES FOR CHEMICAL TECHNICIAN

Operation Monitoring	Quality Control Analysis	Reading Comprehension	Science	Time Management	Writing
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Laboratory flasks — Claisen flasks; Reaction flasks; Vacuum flask traps; Volumetric flasks
- ☐ Laboratory balances — Single-pan balances; Torsion balances; Unequal-arm balances; Westphal balances
- ☐ Fume hoods or cupboards — Exhaust hoods; Explosion-proof fume hoods; Perchloric acid hoods; Radioisotope fume hoods
- ☐ Gas burners — Bunsen burners; Laminar flow burners; Meker burners
- ☐ Laboratory vacuum pumps — Computer-controlled pumps; Diffusion pumps; Volume displacement pumps; Water aspirators

Technology used in this occupation:

- ☐ Analytical or scientific software — Laboratory information management system LIMS software
- ☐ Word processing software — Microsoft Word
- ☐ Data base user interface and query software — Database software
- ☐ Office suite software — Microsoft Office
- ☐ Spreadsheet software — Microsoft Excel

KNOWLEDGE

- ☐ English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ Chemistry — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
- ☐ Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

SKILLS

- ☐ **Operation Monitoring** — Watching gauges, dials, or other indicators to make sure a machine is working properly.
- ☐ **Quality Control Analysis** — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Science** — Using scientific rules and methods to solve problems.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Writing** — Communicating effectively in writing as appropriate for the needs of the audience.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Mathematics** — Using mathematics to solve problems.

ABILITIES

- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Mathematical Reasoning** — The ability to choose the right mathematical methods or formulas to solve a problem.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Written Expression** — The ability to communicate information and ideas in writing so others will understand.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Concern for Others** — Job requires being sensitive to others' needs and feelings and being understanding and helpful on the job.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Chemical Technology/Technician
- ☐ Food Science

CHEMISTS

19-2031.00

EMERGING SECTOR RANKING: #1 in Biotechnology
#4 in Advanced Materials and Chemicals

OCCUPATION DESCRIPTION	Conduct qualitative and quantitative chemical analyses or chemical experiments in laboratories for quality or process control or to develop new products or knowledge.
OTHER REPORTED JOB TITLES	Chemist, Research Chemist, Environmental Chemist, Research and Development Chemist, Analytical Chemist, Formulary Chemist, Nuclear Chemist

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	32.41%
County Occupational Growth:	89
07 Median Hourly Earnings:	\$28.32
Education Level:	Bachelor's degree

TASKS

- ☐ Analyze organic and inorganic compounds to determine chemical and physical properties, composition, structure, relationships, and reactions, utilizing chromatography, spectroscopy, and spectrophotometry techniques.
- ☐ Develop, improve, and customize products, equipment, formulas, processes, and analytical methods.
- ☐ Compile and analyze test information to determine process or equipment operating efficiency and to diagnose malfunctions.
- ☐ Confer with scientists and engineers to conduct analyses of research projects, interpret test results, or develop nonstandard tests.
- ☐ Direct, coordinate, and advise personnel in test procedures for analyzing components and physical properties of materials.
- ☐ Induce changes in composition of substances by introducing heat, light, energy, and chemical catalysts for quantitative and qualitative analysis.
- ☐ Write technical papers and reports and prepare standards and specifications for processes, facilities, products, or tests.
- ☐ Prepare test solutions, compounds, and reagents for laboratory personnel to conduct test.
- ☐ Study effects of various methods of processing, preserving, and packaging on composition and properties of foods.

TOP COMPETENCIES FOR CHEMISTS

Active Learning	Active Listening	Complex Problem Solving	Critical Thinking	Mathematics	Quality Control Analysis	Science	Speaking	Time Management	Writing
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Benchtop centrifuges — Chemical centrifuges; High-speed centrifuges; Tabletop centrifuges
- ☐ Spectrometers — Luminescence spectrometers; Ultraviolet-visible spectrometers
- ☐ Hematology or chemistry mixers — Automatic peptide synthesizers; Mini synthesizers
- ☐ Lasers — Diode lasers; Dye lasers; Nitrogen lasers; Picosecond lasers
- ☐ X ray diffraction equipment — Single crystal x ray diffractometers

Technology used in this occupation:

- ☐ Inventory management software — ChemSW Chemical Inventory System CIS; ItemTracker software; UBI Biotracker
- ☐ Graphics or photo imaging software — Digital imaging software; Graphic software; Microsoft Office Visio; MolDraw *
- ☐ Analytical or scientific software — Laboratory information management system LIMS software; Statistical analysis software; Waters Empower Chromatography Data Software; Wavefunction Spartan
- ☐ Computer aided design CAD software — ChemInnovation Software Chem 4-D; ChemSW Molecular Modeling Pro; Hypercube HyperChem
- ☐ Data base user interface and query software — Logger software; Microsoft Access; Molsearch Pro; Structured query language SQL

KNOWLEDGE

- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Chemistry** — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Quality Control Analysis** — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ☐ **Science** — Using scientific rules and methods to solve problems.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Writing** — Communicating effectively in writing as appropriate for the needs of the audience.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.

ABILITIES

- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Category Flexibility** — The ability to generate or use different sets of rules for combining or grouping things in different ways.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.

ATTRIBUTES

- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Innovation** — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Analytical Chemistry
- ☐ Chemical Physics
- ☐ Chemistry, General
- ☐ Chemistry, Other
- ☐ Inorganic Chemistry
- ☐ Organic Chemistry
- ☐ Physical and Theoretical Chemistry
- ☐ Polymer Chemistry

COMPUTER AND INFORMATION SYSTEMS MANAGERS

11-3021.00

EMERGING SECTOR RANKING: #2 in Communications and Information Technology

OCCUPATION DESCRIPTION	Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming.
OTHER REPORTED JOB TITLES	Information Systems Director (IS Director), MIS Director (Management Information Systems Director), Information Technology Director (IT Director), Information Technology Manager (IT Manager), Data Processing Manager, Director of Application Development

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	10.46%
County Occupational Growth:	192
07 Median Hourly Earnings:	\$50.47
Education Level:	Bachelor's degree

TASKS

- ☐ Manage backup, security and user help systems.
- ☐ Consult with users, management, vendors, and technicians to assess computing needs and system requirements.
- ☐ Direct daily operations of department, analyzing workflow, establishing priorities, developing standards and setting deadlines.
- ☐ Assign and review the work of systems analysts, programmers, and other computer-related workers.
- ☐ Stay abreast of advances in technology.
- ☐ Develop computer information resources, providing for data security and control, strategic computing, and disaster recovery.
- ☐ Review and approve all systems charts and programs prior to their implementation.
- ☐ Evaluate the organization's technology use and needs and recommend improvements, such as hardware and software upgrades.
- ☐ Control operational budget and expenditures.
- ☐ Meet with department heads, managers, supervisors, vendors, and others, to solicit cooperation and resolve problems.

TOP COMPETENCIES FOR COMPUTER AND INFORMATION SYSTEMS MANAGERS

Active Listening	Complex Problem Solving	Critical Thinking	English Language	Active Learning	Judgment and Decision Making	Negotiation	Reading Comprehension
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Computer servers — Mid-range computers; Netware servers; Storage servers; Web servers
- ☐ Access servers — File servers
- ☐ Peripheral controller cards — Industry standard architecture/peripheral component interconnect ISA/PCI cards
- ☐ Network interface cards — Network interface cards NIC
- ☐ Print servers

Technology used in this occupation:

- ☐ Web platform development software — Dynamic hypertext markup language DHTML; Hypertext markup language HTML; JavaScript; Scripting languages
- ☐ Data base management system software — AlphaFour software; Database management software; Microsoft SQL Server; Oracle software
- ☐ Development environment software — Borland Delphi; C; Microsoft .NET Framework; Microsoft Visual Basic
- ☐ Enterprise resource planning ERP software — Microsoft Dynamics AX; Microsoft Dynamics NAV; Oracle E-Business Suite; Oracle JD Edwards OneWorld
- ☐ Customer relationship management CRM software — ACT! software; Microsoft Dynamics CRM; Performance Solutions Technology ManagePro; Provisioning software

KNOWLEDGE

- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ Clerical — Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology.
- ☐ Economics and Accounting — Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
- ☐ Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.

- ☐ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ Education and Training — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.
- ☐ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Negotiation** — Bringing others together and trying to reconcile differences.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ Coordination — Adjusting actions in relation to others' actions.
- ☐ Systems Evaluation — Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
- ☐ Management of Financial Resources — Determining how money will be spent to get the work done, and accounting for these expenditures.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Speech Recognition — The ability to identify and understand the speech of another person.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Leadership — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ Persistence — Job requires persistence in the face of obstacles.
- ☐ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.

RELATED INSTRUCTIONAL PROGRAMS

- | | |
|--|--|
| ☐ Computer Science | ☐ Knowledge Management |
| ☐ Computer and Information Sciences, General | ☐ Management Information Systems, General |
| ☐ Information Resources Management/CIO Training | ☐ Operations Management and Supervision |
| ☐ Information Science/Studies | ☐ System Administration |

COMPUTER PROGRAMMERS

15-1021.00

EMERGING SECTOR RANKING: #2 in Homeland Security
#3 in Communications and Information Technology

OCCUPATION DESCRIPTION	Convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language. Develop and write computer programs to store, locate, and retrieve specific documents, data, and information. May program web sites.
OTHER REPORTED JOB TITLES	Programmer Analyst, Programmer, Computer Programmer, Software Developer, Internet Programmer, Web Programmer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18: -9.86%
County Occupational Growth: -443
07 Median Hourly Earnings: \$34.77

Education Level: Bachelor's degree

TASKS

- ☐ Correct errors by making appropriate changes and rechecking the program to ensure that the desired results are produced.
- ☐ Conduct trial runs of programs and software applications to be sure they will produce the desired information and that the instructions are correct.
- ☐ Compile and write documentation of program development and subsequent revisions, inserting comments in the coded instructions so others can understand the program.
- ☐ Write, update, and maintain computer programs or software packages to handle specific jobs such as tracking inventory, storing or retrieving data, or controlling other equipment.
- ☐ Consult with managerial, engineering, and technical personnel to clarify program intent, identify problems, and suggest changes.
- ☐ Perform or direct revision, repair, or expansion of existing programs to increase operating efficiency or adapt to new requirements.
- ☐ Write, analyze, review, and rewrite programs, using workflow chart and diagram, and applying knowledge of computer capabilities, subject matter, and symbolic logic.
- ☐ Write or contribute to instructions or manuals to guide end users.
- ☐ Investigate whether networks, workstations, the central processing unit of the system, or peripheral equipment are responding to a program's instructions.
- ☐ Prepare detailed workflow charts and diagrams that describe input, output, and logical operation, and convert them into a series of instructions coded in a computer language.

TOP COMPETENCIES FOR COMPUTER PROGRAMMERS

Complex Problem Solving	Critical Thinking	Programming	Active Learning	Active Listening	Learning Strategies	Reading Comprehension	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Computer servers
- ☐ Desktop computers
- ☐ Mainframe computers — Mainframe operating systems

Technology used in this occupation:

- ☐ Data base management system software — Microsoft SQL Server; mSQL software; MySQL software; Pick software
- ☐ Development environment software — C; Microsoft Visual Basic; Source code migration software; Tier generator software
- ☐ Object or component oriented development software — C++; Greatis Object Inspector; PowerSoft PowerBuilder; Sun Microsystems Java
- ☐ Web platform development software — Hypertext markup language HTML; JavaScript; Macromedia ColdFusion; Sun Microsystems Java server pages JSP
- ☐ Graphical user interface development software — Basis BBx VisualPRO/5; Graphical user interface GUI development software
- ☐ Compiler and decompiler software — Code generator software; Command interpreters; Threaded code compiler; Xerces2 Java Parser
- ☐ Program testing software — Debugging software; Low-level debugger software; Source code editor software; Symbolic debugger software

KNOWLEDGE

- ☐ English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Programming** — Writing computer programs for various purposes.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Learning Strategies** — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Operations Analysis** — Analyzing needs and product requirements to create a design.
- ☐ **Technology Design** — Generating or adapting equipment and technology to serve user needs.

ABILITIES

- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Written Expression** — The ability to communicate information and ideas in writing so others will understand.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Artificial Intelligence and Robotics
- ☐ Bioinformatics
- ☐ Computer Graphics
- ☐ Computer Programming, Specific Applications
- ☐ Computer Programming, Vendor/Product Certification
- ☐ Computer Programming/Programmer, General
- ☐ E-Commerce/Electronic Commerce
- ☐ Management

COMPUTER SOFTWARE ENGINEERS, APPLICATIONS

15-1031.00

EMERGING SECTOR RANKING: #1 in Communications and Information Technology
#2 in Homeland Security

OCCUPATION DESCRIPTION	Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use with the aim of optimizing operational efficiency.
OTHER REPORTED JOB TITLES	Software Engineer, Application Integration Engineer, Programmer Analyst, Computer Consultant, Software Architect, Software Developer, Software Development Engineer, Business Systems Analyst, Programmer, Software Analyst

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	34.51%
County Occupational Growth:	1228
07 Median Hourly Earnings:	\$38.24
Education Level:	Bachelor's degree

TASKS

- ☐ Confer with systems analysts, engineers, programmers and others to design system and to obtain information on project limitations and capabilities, performance requirements and interfaces.
- ☐ Modify existing software to correct errors, allow it to adapt to new hardware, or to improve its performance.
- ☐ Analyze user needs and software requirements to determine feasibility of design within time and cost constraints.
- ☐ Consult with customers about software system design and maintenance.
- ☐ Coordinate software system installation and monitor equipment functioning to ensure specifications are met.
- ☐ Design, develop and modify software systems, using scientific analysis and mathematical models to predict and measure outcome and consequences of design.
- ☐ Develop and direct software system testing and validation procedures, programming, and documentation.
- ☐ Analyze information to determine, recommend, and plan computer specifications and layouts, and peripheral equipment modifications.
- ☐ Supervise the work of programmers, technologists and technicians and other engineering and scientific personnel.
- ☐ Obtain and evaluate information on factors such as reporting formats required, costs, and security needs to determine hardware configuration.

TOP COMPETENCIES FOR COMPUTER SOFTWARE ENGINEERS, APPLICATIONS

English Language	Systems Analysis	Troubleshooting	Critical Thinking	Operations Analysis	Reading Comprehension	Technology Design	Complex Problem Solving	Judgment and Decision Making	Mathematics
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TOOLS AND TECHNOLOGY

Tools and Technology used in this occupation:

- ☐ Development environment software — C; Embedded systems development software; IBM Rational Rose XDE Developer; Microsoft Visual Basic
- ☐ Object or component oriented development software — C++; Self; Simulation language SIMULA; Sun Microsystems Java
- ☐ Desktop computers
- ☐ Program testing software — Defect tracking software; Mercury Interactive LoadRunner; Source code editor software; Usability testing software
- ☐ Data base management system software — Computer Associates integrated data management system CA-IDMS; Database management software; Microsoft SQL Server; Oracle DBMS
- ☐ Notebook computers
- ☐ High end computer servers — Application servers
- ☐ Web platform development software — Apache Struts; Hypertext markup language HTML; JavaScript; Ruby on Rails *
- ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA
- ☐ Integrated circuit testers — In circuit emulators ICE; Logic analyzers

* Software developed by a government agency and/or distributed as freeware or shareware.

KNOWLEDGE

- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ **Telecommunications** — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.

SKILLS

- ☐ **Systems Analysis** — Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Operations Analysis** — Analyzing needs and product requirements to create a design.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Technology Design** — Generating or adapting equipment and technology to serve user needs.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Programming** — Writing computer programs for various purposes.

ABILITIES

- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Intercultural Awareness** — The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence** — The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Sensitivity** — The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Intercultural Intelligence** — The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Innovation** — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Artificial Intelligence and Robotics
- ☐ Bioinformatics
- ☐ Computer Engineering Technologies/Technicians, Other
- ☐ Computer Engineering, General
- ☐ Computer Science
- ☐ Computer Software Engineering
- ☐ Information Technology
- ☐ Medical Illustration and Informatics, Other

COMPUTER SUPPORT SPECIALISTS

15-1041.00

EMERGING SECTOR RANKING: #1 in Homeland Security
#5 in Communications and Information Technology

OCCUPATION DESCRIPTION	Provide technical assistance to computer system users. Answer questions or resolve computer problems for clients in person, via telephone or from remote location. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.
OTHER REPORTED JOB TITLES	Information Technology Specialist (IT Specialist), Electronic Data Processing Auditor (EDP Auditor), Help Desk Analyst, Computer Technician, Desktop Support Technician, Office Systems Coordinator

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	7.14%
County Occupational Growth:	261
07 Median Hourly Earnings:	\$21.76
Education Level:	Associate degree

TASKS

- ☐ Answer user inquiries regarding computer software or hardware operation to resolve problems.
- ☐ Enter commands and observe system functioning to verify correct operations and detect errors.
- ☐ Install and perform minor repairs to hardware, software, or peripheral equipment, following design or installation specifications.
- ☐ Oversee the daily performance of computer systems.
- ☐ Set up equipment for employee use, performing or ensuring proper installation of cables, operating systems, or appropriate software.
- ☐ Maintain records of daily data communication transactions, problems and remedial actions taken, or installation activities.
- ☐ Read technical manuals, confer with users, or conduct computer diagnostics to investigate and resolve problems or to provide technical assistance and support.
- ☐ Confer with staff, users, and management to establish requirements for new systems or modifications.
- ☐ Develop training materials and procedures, or train users in the proper use of hardware or software.
- ☐ Refer major hardware or software problems or defective products to vendors or technicians for service.

TOP COMPETENCIES FOR COMPUTER SUPPORT SPECIALISTS

Active Listening	Complex Problem Solving	Critical Thinking	Active Learning	Instruction	Reading Comprehension	Speaking	Writing
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Hard disk arrays — Redundant array of independent disks RAID systems
- ☐ Floppy disks — MS-DOS-bootable disks
- ☐ Power meters
- ☐ Tape arrays — Digital tapes
- ☐ Reflectometers

Technology used in this occupation:

- ☐ Configuration management software — Automated installation software; Deployment software; Patch management software
- ☐ Backup or archival software — Backup and archival software; Disaster recovery software; Microsoft Volume Shadow Copy Service; Symantec LiveState
- ☐ Internet directory services software — Active directory software; Domain name system DNS software; Network directory services software
- ☐ Operating system software — Event log monitor software; Microsoft Windows Pre-installation Environment; Operating system monitoring software; Personal computer diagnostic software Desktop communications software — CrossTec NetOp Remote Control; Remote control software; Stac Software ReachOut; Symantec pcAnywhere

KNOWLEDGE

- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

- ☐ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ☐ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ Psychology — Knowledge of human behavior and performance; individual differences in ability, personality, and interests; learning and motivation; psychological research methods; and the assessment and treatment of behavioral and affective disorders.
- ☐ Telecommunications — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Instructing** — Teaching others how to do something.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Writing** — Communicating effectively in writing as appropriate for the needs of the audience.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Learning Strategies** — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.

ABILITIES

- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Speech Recognition — The ability to identify and understand the speech of another person.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.

ATTRIBUTES

- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Concern for Others — Job requires being sensitive to others' needs and feelings and being understanding and helpful on the job.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Persistence — Job requires persistence in the face of obstacles.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.

RELATED INSTRUCTIONAL PROGRAMS

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|--|--|
| ☐ Accounting and Computer Science | ☐ Computer Software Technology/Technician |
| ☐ Agricultural Business Technology | ☐ Data Processing and Data Processing Technology/Technician |
| ☐ Computer Hardware Technology/Technician | ☐ Medical Office Computer Specialist/Assistant |

COMPUTER SYSTEMS ANALYSTS

15-1051.00

EMERGING SECTOR RANKING: #2 in Homeland Security

OCCUPATION DESCRIPTION	Analyze science, engineering, business, and all other data processing problems for application to electronic data processing systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software. May supervise computer programmers.
OTHER REPORTED JOB TITLES	Systems Analyst, Programmer Analyst, Computer Systems Consultant, Business Systems Analyst, Systems Engineer, Computer Specialist, Computer Systems Analyst, Data Processing Systems Analyst, Information Technology Consultant (IT Consultant), Information Te

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18: 23.69%
 County Occupational Growth: 1,093
 07 Median Hourly Earnings: \$36.13

Education Level: Bachelor's degree

TASKS

- ☐ Provide staff and users with assistance solving computer related problems, such as malfunctions and program problems.
- ☐ Test, maintain, and monitor computer programs and systems, including coordinating the installation of computer programs and systems.
- ☐ Use object-oriented programming languages, as well as client and server applications development processes and multimedia and Internet technology.
- ☐ Confer with clients regarding the nature of the information processing or computation needs a computer program is to address.
- ☐ Coordinate and link the computer systems within an organization to increase compatibility and so information can be shared.
- ☐ Consult with management to ensure agreement on system principles.
- ☐ Expand or modify system to serve new purposes or improve work flow.
- ☐ Interview or survey workers, observe job performance or perform the job to determine what information is processed and how it is processed.
- ☐ Determine computer software or hardware needed to set up or alter system.
- ☐ Train staff and users to work with computer systems and programs.

TOP COMPETENCIES FOR COMPUTER SYSTEMS ANALYSTS

Active Learning	Complex Problem Solving	Critical Thinking	Customer and Personal Service	Education and Training	English Language	Monitoring	Reading Comprehension	Time Management	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Desktop computers
- ☐ Notebook computers
- ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA
- ☐ Mainframe computers

Technology used in this occupation:

- ☐ Configuration management software — Automated installation software; IBM Rational ClearCase; Wise Solutions software; Wise Solutions Wise for Windows Installer
- ☐ Data base management system software — Database management software; Microsoft SQL Server; Oracle DBMS; Relational database management software
- ☐ Program testing software — Compatibility testing software; Defect tracking software; Mercury Interactive LoadRunner; Usability testing software
- ☐ Web platform development software — Active directory software; Allaire ColdFusion; Hypertext markup language HTML; JavaScript
- ☐ Development environment software — C; IBM Rational Rose XDE Developer; Microsoft Visual Basic; Symantec Visual Caf
- ☐ Object or component oriented development software — C++; Distributed component object model DCOM software; Rapide; Sun Microsystems Java

KNOWLEDGE

- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Education and Training** — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

- ☐ Telecommunications — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.
- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Monitoring** — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ Quality Control Analysis — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ☐ Service Orientation — Actively looking for ways to help people.
- ☐ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Speech Recognition — The ability to identify and understand the speech of another person.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.

ATTRIBUTES

- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Persistence — Job requires persistence in the face of obstacles.
- ☐ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Computer Systems Analysis/Analyst
- ☐ Computer and Information Sciences, General
- ☐ Information Technology
- ☐ Web/Multimedia Management and Webmaster

ELECTRICAL ENGINEERING TECHNICIANS

17-3023.03

EMERGING SECTOR RANKING: #2 in Medical Devices
#2 in Robotics and Automation
#3 in Advanced Electronics and Controls

OCCUPATION DESCRIPTION	Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.
OTHER REPORTED JOB TITLES	Electronics Engineering Technician, Engineering Technician, Electronics Technician, Technician, Refurbish Technician (Refurb Tech), Electrical Technician, Electronics Test Technician, Engineering Aide, Failure Analysis Technician (FA Technician), Field En

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	11.14%
County Occupational Growth:	111
07 Median Hourly Earnings:	\$24.23
Education Level:	Associate degree

TASKS

- ☐ Provide technical assistance and resolution when electrical or engineering problems are encountered before, during, and after construction.
- ☐ Assemble electrical and electronic systems and prototypes according to engineering data and knowledge of electrical principles, using hand tools and measuring instruments.
- ☐ Install and maintain electrical control systems and solid state equipment.
- ☐ Modify electrical prototypes, parts, assemblies, and systems to correct functional deviations.
- ☐ Set up and operate test equipment to evaluate performance of developmental parts, assemblies, or systems under simulated operating conditions, and record results.
- ☐ Collaborate with electrical engineers and other personnel to identify, define, and solve developmental problems.
- ☐ Build, calibrate, maintain, troubleshoot and repair electrical instruments or testing equipment.
- ☐ Analyze and interpret test information to resolve design-related problems.
- ☐ Write commissioning procedures for electrical installations.
- ☐ Prepare project cost and work-time estimates.

TOP COMPETENCIES FOR ELECTRICAL ENGINEERING TECHNICIANS

Active Listening	Critical Thinking	Design	Engineering and Technology	English Language	Learning Strategies	Mathematics	Production and Processing	Reading Comprehension	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Microprocessors — Microcomputers
- ☐ Electronic measuring probes — Current probes; Voltage probes
- ☐ Multimeters — Signal measuring equipment
- ☐ Soldering or desoldering or combined stations — Desoldering stations; Soldering stations
- ☐ Power drills — Drills

Technology used in this occupation:

- ☐ Data base user interface and query software — Database software; Oracle software
- ☐ Analytical or scientific software — Mentor Graphics ModelSim; Proportional integral derivative control PID software; Root cause analysis software; The Mathworks MATLAB
- ☐ Computer aided design CAD software — Autodesk AutoCAD; Cadence software; OrCAD Capture; Prentice Hall Electronic Workbench MultiSim
- ☐ Spreadsheet software — Microsoft Excel
- ☐ Development environment software — Assembler; C; Verilog

KNOWLEDGE

- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Production and Processing** — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.

- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Learning Strategies** — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- ☐ Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ☐ Repairing — Repairing machines or systems using the needed tools.
- ☐ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Finger Dexterity — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Written Expression — The ability to communicate information and ideas in writing so others will understand.
- ☐ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.

ATTRIBUTES

- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Innovation — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Leadership — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ Persistence — Job requires persistence in the face of obstacles.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Computer Engineering Technology/Technician
- ☐ Computer Technology/Computer Systems Technology
- ☐ Electrical and Electronic Engineering Technologies/Technicians, Other
- ☐ Electrical, Electronic and Communications Engineering Technology/Technician
- ☐ Telecommunications

ELECTRICAL ENGINEERS

17-2071.00

EMERGING SECTOR RANKING: #1 in Advanced Electronics and Controls
#1 in Robotics and Automation
#2 in Advanced Materials and Chemicals
#3 in Medical Devices

OCCUPATION DESCRIPTION	Design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use.
OTHER REPORTED JOB TITLES	Electrical Engineer, Electrical Design Engineer, Broadcast Engineer, Test Engineer, Controls Engineer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	6.29%
County Occupational Growth:	96
07 Median Hourly Earnings:	\$36.58
Education Level:	Bachelor's degree

TASKS

- ☐ Confer with engineers, customers, and others to discuss existing or potential engineering projects and products.
- ☐ Design, implement, maintain, and improve electrical instruments, equipment, facilities, components, products, and systems for commercial, industrial, and domestic purposes.
- ☐ Operate computer-assisted engineering and design software and equipment to perform engineering tasks.
- ☐ Direct and coordinate manufacturing, construction, installation, maintenance, support, documentation, and testing activities to ensure compliance with specifications, codes, and customer requirements.
- ☐ Perform detailed calculations to compute and establish manufacturing, construction, and installation standards and specifications.
- ☐ Inspect completed installations and observe operations to ensure conformance to design and equipment specifications and compliance with operational and safety standards.
- ☐ Plan and implement research methodology and procedures to apply principles of electrical theory to engineering projects.
- ☐ Prepare specifications for purchase of materials and equipment.
- ☐ Supervise and train project team members as necessary.
- ☐ Investigate and test vendors' and competitors' products.

TOP COMPETENCIES FOR ELECTRICAL ENGINEERS

Active Listening	Complex Problem Solving	Engineering and Technology	Judgment and Decision Making	Mathematics	Reading Comprehension	Time Management	Trouble-shooting	Design	English Language
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Laboratory evaporators — Electron beam evaporators; Filament evaporators; Metal evaporation systems; Vacuum system/thermal evaporators
- ☐ Semiconductor process systems — Spin-coaters; Wafer steppers; Wet chemical clean benches; Wire bonders
- ☐ Signal generators — Programmable function generators; Synthesized continuous wave CW generators; Vector signal generators
- ☐ Spectrometers — Auger electron spectrometers; Electrochemical CV dopant profilers; Photoluminescence spectrometers; X ray photoemission spectrometers
- ☐ Tube furnaces — Doping tubes; Oxidation tubes; Vertical furnaces

Technology used in this occupation:

- ☐ Program testing software — Debugging software; Defect tracking software
- ☐ Computer aided design CAD software — Autodesk AutoCAD; Electronic design automation EDA software; Physical design software; Printed circuit board design software
- ☐ Analytical or scientific software — Finite element method FEM software; Synopsys PrimeTime; Tektronix EZ-TEST; The Mathworks MATLAB
- ☐ Development environment software — C; Microsoft Visual Basic; Programmed logic controller PLC code generation software; VHDL hardware description language VHDL
- ☐ Object or component oriented development software — C++; JHDL; Practical extraction and reporting language Perl; Python

KNOWLEDGE

- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Telecommunications** — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.
- ☐ **Physics** — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and

mechanical, electrical, atomic and sub-atomic structures and processes.

- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Systems Analysis** — Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- ☐ **Technology Design** — Generating or adapting equipment and technology to serve user needs.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

ABILITIES

- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Mathematical Reasoning** — The ability to choose the right mathematical methods or formulas to solve a problem.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Visualization** — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Self Control** — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Electrical, Electronics and Communications Engineering

ELECTRICIANS

47-2111.00

EMERGING SECTOR RANKING: #2 in Alternative Energy and Power Generation Technology

OCCUPATION DESCRIPTION	Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.
OTHER REPORTED JOB TITLES	Electrician, Journeyman Electrician, Inside Wireman, Maintenance Electrician

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	6.92%
County Occupational Growth:	225
07 Median Hourly Earnings:	\$32.41
Education Level:	Long-term on-the-job training

TASKS

- ☐ Assemble, install, test, and maintain electrical or electronic wiring, equipment, appliances, apparatus, and fixtures, using hand tools and power tools.
- ☐ Diagnose malfunctioning systems, apparatus, and components, using test equipment and hand tools, to locate the cause of a breakdown and correct the problem.
- ☐ Connect wires to circuit breakers, transformers, or other components.
- ☐ Inspect electrical systems, equipment, and components to identify hazards, defects, and the need for adjustment or repair, and to ensure compliance with codes.
- ☐ Advise management on whether continued operation of equipment could be hazardous.
- ☐ Test electrical systems and continuity of circuits in electrical wiring, equipment, and fixtures, using testing devices such as ohmmeters, voltmeters, and oscilloscopes, to ensure compatibility and safety of system.
- ☐ Maintain current electrician's license or identification card to meet governmental regulations.
- ☐ Plan layout and installation of electrical wiring, equipment and fixtures, based on job specifications and local codes.
- ☐ Direct and train workers to install, maintain, or repair electrical wiring, equipment, and fixtures.
- ☐ Prepare sketches or follow blueprints to determine the location of wiring and equipment and to ensure conformance to building and safety codes.

TOP COMPETENCIES FOR ELECTRICIANS

Active Learning	Active Listening	Customer and Personal Service	English Language	Judgment and Decision Making	Mathematics	Mechanical	Reading Comprehension	Time Management	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Cable reels — Single reel cable trailers; Wheeled wire dispensers; Wire dollies; Wire hand caddies
- ☐ Screwdrivers — Insulated screwdrivers; Phillips head screwdrivers; Round shank screwdrivers; Square shank screwdrivers
- ☐ Voltage or current meters — Milliameters; Test lamps; Volt tick meters; Voltmeters
- ☐ Wire or cable cutters — Cable cutters; High-leverage cable cutters; Insulated cable cutters; Utility cable cutters
- ☐ Stripping tools — Automatic insulation strippers; Self-adjusting insulation strippers; Universal stripping tools; Wire strippers

Technology used in this occupation:

- ☐ Analytical or scientific software — Electrosoft FlashWorks; Elite ECOORD; Lighting calculation software; SoftEmpire Electrical Calculations
- ☐ Computer aided design CAD software — One Mile Up Panel Planner; SmartDraw software
- ☐ Data base user interface and query software — Database software; Insight Direct ServiceCEO; Shafer Service Systems software; Timberline Office
- ☐ Project management software — Construction Master Pro software; Craftsman CD Estimator
- ☐ Word processing software — Socrates Contractor's Library

KNOWLEDGE

- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ **Public Safety and Security** — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- ☐ **Building and Construction** — Knowledge of materials, methods, and tools involved in construction/repair of houses, buildings, or other structures such as highways and roads.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Equipment Selection** — Determining the kind of tools and equipment needed to do a job.
- ☐ **Repairing** — Repairing machines or systems using the needed tools.
- ☐ **Installation** — Installing equipment, machines, wiring, or programs to meet specifications.

ABILITIES

- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Extent Flexibility** — The ability to bend, stretch, twist, or reach with your body, arms, and/or legs.
- ☐ **Finger Dexterity** — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Manual Dexterity** — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Trunk Strength** — The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing.
- ☐ **Arm-Hand Steadiness** — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ☐ **Gross Body Equilibrium** — The ability to keep or regain your body balance or stay upright when in an unstable position.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Innovation** — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Leadership** — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Electrician

ELECTRONICS ENGINEERING TECHNICIANS

17-3023.01

EMERGING SECTOR RANKING: #1 in Advanced Electronics and Controls
#1 in Medical Devices
#3 in Robotics and Automation

OCCUPATION DESCRIPTION	Lay out, build, test, troubleshoot, repair, and modify developmental and production electronic components, parts, equipment, and systems, such as computer equipment, missile control instrumentation, electron tubes, test equipment, and machine tool numerical controls, applying principles and theories of electronics, electrical circuitry, engineering mathematics, electronic and electrical testing, and physics. Usually work under direction of engineering staff.
OTHER REPORTED JOB TITLES	Electronics Engineering Technician, Engineering Technician, Electronics Technician, Technician, Refurbish Technician (Refurb Tech), Electrical Technician, Electronics Test Technician, Engineering Aide, Failure Analysis Technician (FA Technician)

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18: 11.14%
County Occupational Growth: 111
07 Median Hourly Earnings: \$24.23

Education Level: Associate degree

TASKS

- ☐ Test electronics units, using standard test equipment, and analyze results to evaluate performance and determine need for adjustment.
- ☐ Perform preventative maintenance and calibration of equipment and systems.
- ☐ Read blueprints, wiring diagrams, schematic drawings, and engineering instructions for assembling electronics units, applying knowledge of electronic theory and components.
- ☐ Identify and resolve equipment malfunctions, working with manufacturers and field representatives as necessary to procure replacement parts.
- ☐ Maintain system logs and manuals to document testing and operation of equipment.
- ☐ Assemble, test, and maintain circuitry or electronic components according to engineering instructions, technical manuals, and knowledge of electronics, using hand and power tools.
- ☐ Adjust and replace defective or improperly functioning circuitry and electronics components, using hand tools and soldering iron.
- ☐ Procure parts and maintain inventory and related documentation.
- ☐ Maintain working knowledge of state-of-the-art tools or software by reading or attending conferences, workshops or other training.
- ☐ Provide user applications and engineering support and recommendations for new and existing equipment with regard to installation, upgrades and enhancement.

TOP COMPETENCIES FOR ELECTRONICS ENGINEERING TECHNICIANS

Complex Problem Solving	English Language	Equipment Selection	Judgment and Decision Making	Mathematics	Mechanical	Reading Comprehension	Repairing	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Electronic measuring probes — Current probes; Voltage probes
- ☐ Soldering irons or guns — Soldering equipment
- ☐ Soldering or desoldering or combined stations — Soldering stations
- ☐ Voltage or current meters — Digital voltmeters DVM; Voltage testers
- ☐ Multimeters — Signal measuring equipment

Technology used in this occupation:

- ☐ Analytical or scientific software — Mentor Graphics ModelSim; Root cause analysis software; The Mathworks MATLAB
- ☐ Computer aided design CAD software — Cadence software; MicroSim Pspice; Prentice Hall Electronic Workbench MultiSim
- ☐ Data base user interface and query software — Database software; Microsoft Access
- ☐ Development environment software — C; Microsoft Visual Basic; National Instruments LabVIEW; Verilog
- ☐ Spreadsheet software — Microsoft Excel

KNOWLEDGE

- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Equipment Selection** — Determining the kind of tools and equipment needed to do a job.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Repairing** — Repairing machines or systems using the needed tools.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ Equipment Maintenance — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- ☐ Operation Monitoring — Watching gauges, dials, or other indicators to make sure a machine is working properly.
- ☐ Troubleshooting — Determining causes of operating errors and deciding what to do about it.

ABILITIES

- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.

ATTRIBUTES

- ☐ Communicating with Supervisors, Peers, or Subordinates — Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.
- ☐ Documenting/Recording Information — Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form.
- ☐ Getting Information — Observing, receiving, and otherwise obtaining information from all relevant sources.
- ☐ Identifying Objects, Actions, and Events — Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.
- ☐ Inspecting Equipment, Structures, or Material — Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.
- ☐ Interacting With Computers — Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- ☐ Making Decisions and Solving Problems — Analyzing information and evaluating results to choose the best solution and solve problems.
- ☐ Organizing, Planning, and Prioritizing Work — Developing specific goals and plans to prioritize, organize, and accomplish your work.
- ☐ Repairing and Maintaining Electronic Equipment — Servicing, repairing, calibrating, regulating, fine-tuning, or testing machines, devices, and equipment that operate primarily on the basis of electrical or electronic (not mechanical) principles.
- ☐ Analyzing Data or Information — Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.

RELATED INSTRUCTIONAL PROGRAMS

- | | |
|--|--|
| ☐ Computer Engineering Technology/Technician | ☐ Electrical, Electronic and Communications Engineering Technology/Technician |
| ☐ Computer Technology/Computer Systems Technology | ☐ Telecommunications |
| ☐ Electrical and Electronic Engineering Technologies/Technicians, Other | |

ELECTRONICS ENGINEERS, EXCEPT COMPUTER

17-2072.00

EMERGING SECTOR RANKING: #1 in Advanced Electronics and Controls

OCCUPATION DESCRIPTION	Research, design, develop, and test electronic components and systems for commercial, industrial, military, or scientific use utilizing knowledge of electronic theory and materials properties. Design electronic circuits and components for use in fields such as telecommunications, aerospace guidance and propulsion control, acoustics, or instruments and controls.
OTHER REPORTED JOB TITLES	Engineer, Electrical Engineer, Design Engineer, Product Engineer, Test Engineer, Electronics Engineer, Engineering Manager, Integrated Circuit Design Engineer (IC Design Engineer), Manufacturing Engineer, Application Engineer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	8.71%
County Occupational Growth:	80
07 Median Hourly Earnings:	\$37.50
Education Level:	Bachelor's degree

TASKS

- ☐ Design electronic components, software, products or systems for commercial, industrial, medical, military, or scientific applications.
- ☐ Provide technical support and instruction to staff or customers regarding equipment standards, assisting with specific, difficult in-service engineering.
- ☐ Operate computer-assisted engineering and design software and equipment to perform engineering tasks.
- ☐ Analyze system requirements, capacity, cost, and customer needs to determine feasibility of project and develop system plan.
- ☐ Confer with engineers, customers, vendors or others to discuss existing and potential engineering projects or products.
- ☐ Review and evaluate work of others, inside and outside the organization, to ensure effectiveness, technical adequacy and compatibility in the resolution of complex engineering problems.
- ☐ Determine material and equipment needs and order supplies.
- ☐ Inspect electronic equipment, instruments, products, and systems to ensure conformance to specifications, safety standards, and applicable codes and regulations.
- ☐ Evaluate operational systems, prototypes and proposals and recommend repair or design modifications, based on factors such as environment, service, cost, and system capabilities.
- ☐ Prepare documentation containing information such as confidential descriptions and specifications of proprietary hardware and software, product development and introduction schedules, product costs, and information about product performance weaknesses.

TOP COMPETENCIES FOR ELECTRONICS ENGINEERS, EXCEPT COMPUTER

Active Learning	Active Listening	Complex Problem Solving	Computers and Electronics	Critical Thinking	Engineering and Technology	English Language	Judgment and Decision Making	Mathematics	Reading Comprehension	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Counters — Electronics counters
- ☐ Electrical inductance sensors — Inductance capacitance resistance LCR meters
- ☐ Electronic measuring probes — Electronics probes
- ☐ Microcontrollers — Programmable logic controllers PLC
- ☐ Microprocessors

Technology used in this occupation:

- ☐ Development environment software — C; Formula translation/translator FORTRAN; Very high-speed integrated circuit VHSIC hardware description language VHDL; Visual Numerics PV-WAVE
- ☐ Object or component oriented development software — C++; Microsoft Visual Basic.NET; Microsoft Visual C# .NET
- ☐ Operating system software — Hewlett-Packard OpenVMS; Real time operating system RTOS software
- ☐ Analytical or scientific software — Ansoft Simplorer; Synopsys Saber; The Mathworks MATLAB; The MathWorks Simulink
- ☐ Computer aided design CAD software — Autodesk AutoCAD; SolidWorks CAD; Two-dimensional 2D computer aided design CAD software; Xilinx Integrated Software Environment ISE

KNOWLEDGE

- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ **Physics** — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub-atomic structures and processes.
- ☐ **Production and Processing** — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Equipment Selection** — Determining the kind of tools and equipment needed to do a job.

ABILITIES

- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Selective Attention** — The ability to concentrate on a task over a period of time without being distracted.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.

ATTRIBUTES

- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Innovation** — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Electrical, Electronics and Communications Engineering

ENGINEERING MANAGERS

11-9041.00

EMERGING SECTOR RANKING: #1 in Alternative Energy and Power Generation Technology

OCCUPATION DESCRIPTION	Plan, direct, or coordinate activities in such fields as architecture and engineering or research and development in these fields.
OTHER REPORTED JOB TITLES	Project Engineer, Engineering Manager, Project Engineering Manager, Project Manager, Principal Engineer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	4.36%
County Occupational Growth:	116
07 Median Hourly Earnings:	\$56.02
Education Level:	Bachelor's or higher degree, Plus work experience

TASKS

- ☐ Confer with management, production, and marketing staff to discuss project specifications and procedures.
- ☐ Coordinate and direct projects, making detailed plans to accomplish goals and directing the integration of technical activities.
- ☐ Analyze technology, resource needs, and market demand, to plan and assess the feasibility of projects.
- ☐ Plan and direct the installation, testing, operation, maintenance, and repair of facilities and equipment.
- ☐ Direct, review, and approve product design and changes.
- ☐ Recruit employees, assign, direct, and evaluate their work, and oversee the development and maintenance of staff competence.
- ☐ Prepare budgets, bids, and contracts, and direct the negotiation of research contracts.
- ☐ Develop and implement policies, standards and procedures for the engineering and technical work performed in the department, service, laboratory or firm.
- ☐ Perform administrative functions such as reviewing and writing reports, approving expenditures, enforcing rules, and making decisions about the purchase of materials or services.
- ☐ Review and recommend or approve contracts and cost estimates.

TOP COMPETENCIES FOR ENGINEERING MANAGERS

Active Listening	Administration and Management	Critical Thinking	Customer and Personal Service	Engineering and Technology	Mathematics	Time Management	Judgment and Decision Making	Operations Analysis
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Desktop computers
- ☐ Notebook computers
- ☐ Personal computers
- ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA

Technology used in this occupation:

- ☐ Project management software — Microsoft Project; Realization Project Flow; The Gordian Group PROGEN Online
- ☐ Word processing software — Microsoft Word
- ☐ Computer aided design CAD software — Autodesk AutoCAD; Hewlett Packard SolidDesigner; Pro-E CAD software; SolidWorks CAD
- ☐ Analytical or scientific software — HEC RAS *; HEC-1 *; Water surface pressure gradient WSPG software
- ☐ Calendar and scheduling software — Maintenance scheduling software; Scheduling software

KNOWLEDGE

- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and

programming.

- ☐ Physics — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub-atomic structures and processes.
- ☐ Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- ☐ Building and Construction — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Operations Analysis** — Analyzing needs and product requirements to create a design.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.

ABILITIES

- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Self Control** — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

RELATED INSTRUCTIONAL PROGRAMS

- | | |
|---|---|
| ☐ Aerospace, Aeronautical and Astronautical Engineering | ☐ Architecture (BArch, BA/BS, MArch, MA/MS, PhD) |
| ☐ Agricultural/Biological Engineering and Bioengineering | ☐ Biomedical/Medical Engineering |
| ☐ Architectural Engineering | ☐ Ceramic Sciences and Engineering |

ENVIRONMENTAL SCIENTISTS AND SPECIALISTS, INCLUDING HEALTH

19-2041.00

EMERGING SECTOR RANKING: #2 in Alternative Energy and Power Generation Technology

OCCUPATION DESCRIPTION	Conduct research or perform investigation for the purpose of identifying, abating, or eliminating sources of pollutants or hazards that affect either the environment or the health of the population. Utilizing knowledge of various scientific disciplines may collect, synthesize, study, report, and take action based on data derived from measurements or observations of air, food, soil, water, and other sources.
OTHER REPORTED JOB TITLES	Environmental Scientist, Environmental Specialist, Environmental Analyst, Environmental Protection Specialist, Hazardous Substances Scientist, Environmental Health and Safety Specialist, Research Environmental Scientist, Environmental Health Specialist

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	20.7%
County Occupational Growth:	37
07 Median Hourly Earnings:	\$27.36
Education Level:	Master's degree

TASKS

- ☐ Conduct environmental audits and inspections, and investigations of violations.
- ☐ Evaluate violations or problems discovered during inspections to determine appropriate regulatory actions or to provide advice on the development and prosecution of regulatory cases.
- ☐ Communicate scientific and technical information through oral briefings, written documents, workshops, conferences, and public hearings.
- ☐ Review and implement environmental technical standards, guidelines, policies, and formal regulations that meet all appropriate requirements.
- ☐ Provide technical guidance, support, and oversight to environmental programs, industry, and the public.
- ☐ Provide advice on proper standards and regulations or the development of policies, strategies, and codes of practice for environmental management.
- ☐ Analyze data to determine validity, quality, and scientific significance, and to interpret correlations between human activities and environmental effects.
- ☐ Collect, synthesize, and analyze data derived from pollution emission measurements, atmospheric monitoring, meteorological and mineralogical information, and soil or water samples.
- ☐ Determine data collection methods to be employed in research projects and surveys.
- ☐ Prepare charts or graphs from data samples, providing summary information on the environmental relevance of the data.

TOP COMPETENCIES FOR ENVIRONMENTAL SCIENTISTS AND SPECIALISTS, INCLUDING HEALTH

Integrity

Persistence

Self Control

Stress Tolerance

TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Air samplers or collectors — Atmospheric deposition collectors; Lead air sampling kits; Mercury monitors; Particulate samplers
- ☐ Radiation detectors — Digital survey meters; Field radiological measuring devices; Geiger meters; Scintillation probes
- ☐ Soil core sampling apparatus — Bottom dredge samplers; Core samplers; Hand held augers; Soil probes
- ☐ Water analyzers — Coliform testing systems; Comparator water test kits; Drop count industrial water test kits; Multiparameter water quality instruments
- ☐ Water samplers — Automatic samplers; Groundwater monitoring systems; Lead water sampling kits; Rain water samplers

Technology used in this occupation:

- ☐ Compliance software — Ecotech WinAQM; Emissions tracking software; Material safety data sheet MSDS software; MIRS
- ☐ Compliance Analytical or scientific software — Laboratory information management system LIMS software; Statistical analysis software; TANKS *; Wolfel IMMI
- ☐ Data base user interface and query software — EarthSoft EQUIS Geology; Microsoft Access; Smart Data Solutions RS Solutions; Tucows ChemBase
- ☐ Graphics or photo imaging software — Adobe Illustrator; Corel CorelDraw; Graphic software
- ☐ Map creation software — ESRI ArcView; Geomechanical design analysis GDA software; Golden Software Surfer; RockWare ArcMap

KNOWLEDGE

- ☐ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ Biology — Knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
- ☐ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.

- ☐ Geography — Knowledge of principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution of plant, animal, and human life.
- ☐ Law and Government — Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.
- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- ☐ Chemistry — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.

SKILLS

- ☐ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ Coordination — Adjusting actions in relation to others' actions.
- ☐ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ☐ Science — Using scientific rules and methods to solve problems.
- ☐ Service Orientation — Actively looking for ways to help people.
- ☐ Speaking — Talking to others to convey information effectively.
- ☐ Time Management — Managing one's own time and the time of others.
- ☐ Writing — Communicating effectively in writing as appropriate for the needs of the audience.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Far Vision — The ability to see details at a distance.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Written Expression — The ability to communicate information and ideas in writing so others will understand.

ATTRIBUTES

- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Self Control** — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Environmental Science
- ☐ Environmental Studies

FIRST-LINE SUPERVISORS/MANAGERS OF PRODUCTION AND OPERATING WORKERS

51-1011.00

EMERGING SECTOR RANKING: #4 in Medical Devices

OCCUPATION DESCRIPTION	Supervise and coordinate the activities of production and operating workers, such as inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators.
OTHER REPORTED JOB TITLES	Production Supervisor, Manufacturing Supervisor, Shift Supervisor, Team Leader, Production Manager, Plant Manager, Assembly Supervisor, Department Manager, Converting Supervisor, Molding Supervisor

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	-9.17%
County Occupational Growth:	-304
07 Median Hourly Earnings:	\$29.73
Education Level:	Work experience in a related occupation

TASKS

- ☐ Enforce safety and sanitation regulations.
- ☐ Direct and coordinate the activities of employees engaged in the production or processing of goods, such as inspectors, machine setters, and fabricators.
- ☐ Read and analyze charts, work orders, production schedules, and other records and reports, in order to determine production requirements and to evaluate current production estimates and outputs.
- ☐ Confer with other supervisors to coordinate operations and activities within or between departments.
- ☐ Plan and establish work schedules, assignments, and production sequences to meet production goals.
- ☐ Inspect materials, products, or equipment to detect defects or malfunctions.
- ☐ Demonstrate equipment operations and work and safety procedures to new employees, or assign employees to experienced workers for training.
- ☐ Observe work, and monitor gauges, dials, and other indicators to ensure that operators conform to production or processing standards.
- ☐ Confer with management or subordinates to resolve worker problems, complaints, or grievances.
- ☐ Interpret specifications, blueprints, job orders, and company policies and procedures for workers.

TOP COMPETENCIES FOR FIRST-LINE SUPERVISORS/MANAGERS OF PRODUCTION AND OPERATING WORKERS

Administration and Management	Customer and Personal Service	Education and Training	English Language	Mechanical
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Desktop computers
- ☐ Laser printers
- ☐ Notebook computers
- ☐ Personal computers
- ☐ Touch screen monitors — Operator terminals

Technology used in this occupation:

- ☐ Enterprise resource planning ERP software — Bowen & Groves M1 ERP; Retain Resource Planning; SAP software; Technology Group International Enterprise 21 ERP
- ☐ Electronic mail software — IBM Lotus Notes; Microsoft Outlook
- ☐ Materials requirements planning logistics and supply chain software — Integrated materials management systems; Materials management software; QA Software QMS Materials Management
- ☐ Project management software — Microsoft Total Quality Control Management; Total quality management TQM software
- ☐ Time accounting software — Kronos Workforce Timekeeper; Timekeeping software; Work Technology WorkTech Time

KNOWLEDGE

- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Education and Training** — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.

- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.
- ☐ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ Coordination — Adjusting actions in relation to others' actions.
- ☐ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ Instructing — Teaching others how to do something.
- ☐ Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ Management of Personnel Resources — Motivating, developing, and directing people as they work, identifying the best people for the job.
- ☐ Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ☐ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ☐ Speaking — Talking to others to convey information effectively.
- ☐ Time Management — Managing one's own time and the time of others.

ABILITIES

- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Speech Recognition — The ability to identify and understand the speech of another person.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Written Expression — The ability to communicate information and ideas in writing so others will understand.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.

ATTRIBUTES

- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Leadership — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ Persistence — Job requires persistence in the face of obstacles.
- ☐ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Integrity — Job requires being honest and ethical.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Operations Management and Supervision

FIRST-LINE SUPERVISORS/MANAGERS OF CONSTRUCTION TRADES AND EXTRACTION WORKERS

47-1011.00

EMERGING SECTOR RANKING: #2 in Alternative Energy and Power Generation

OCCUPATION DESCRIPTION	Directly supervise and coordinate activities of construction or extraction workers.
OTHER REPORTED JOB TITLES	Construction Supervisor, Construction Foreman, Construction Superintendent, Project Manager, Field Supervisor, Project Superintendent, Job Foreman, Fence Installer Foreman, Field Operations Supervisor, General Foreman

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	2.33%
County Occupational Growth:	41
07 Median Hourly Earnings:	\$33.59
Education Level:	Work experience in a related occupation

TASKS

- ☐ Examine and inspect work progress, equipment, and construction sites to verify safety and to ensure that specifications are met.
- ☐ Read specifications such as blueprints to determine construction requirements and to plan procedures.
- ☐ Estimate material and worker requirements to complete jobs.
- ☐ Supervise, coordinate, and schedule the activities of construction or extractive workers.
- ☐ Confer with managerial and technical personnel, other departments, and contractors in order to resolve problems and to coordinate activities.
- ☐ Coordinate work activities with other construction project activities.
- ☐ Order or requisition materials and supplies.
- ☐ Locate, measure, and mark site locations and placement of structures and equipment, using measuring and marking equipment.
- ☐ Record information such as personnel, production, and operational data on specified forms and reports.
- ☐ Assign work to employees, based on material and worker requirements of specific jobs.

TOP COMPETENCIES FOR FIRST-LINE SUPERVISORS/MANAGERS OF CONSTRUCTION TRADES AND EXTRACTION WORKERS

Active Listening	Administration and Management	Coordination	Customer and Personal Service	Design	Engineering and Technology	Judgment and Decision Making	Mathematics	Reading Comprehension	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Gas welding or brazing or cutting apparatus — Acetylene welding equipment; Arc welding equipment; Oxyfuel gas welders
- ☐ Levels — Bubble levels; Precision levels
- ☐ Manlift or personnel lift — Aerial personnel lifts; Manlifts
- ☐ Screwdrivers — Flat screwdrivers; Insulated screwdrivers; Phillips head screwdrivers
- ☐ Wire lug crimping tool — Hydraulic crimping tools; Wire crimpers

Technology used in this occupation:

- ☐ Calendar and scheduling software — FranklinCovey TabletPlanner; Scheduling software
- ☐ Data base user interface and query software — Data entry software; Mi-Co Mi-Forms Client
- ☐ Graphics or photo imaging software — Graphics software
- ☐ Inventory management software — Inventory tracking software
- ☐ Office suite software — Microsoft Office

KNOWLEDGE

- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Building and Construction** — Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways

and roads.

- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ **Personnel and Human Resources** — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.
- ☐ **Public Safety and Security** — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.
- ☐ **Production and Processing** — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Equipment Selection** — Determining the kind of tools and equipment needed to do a job.
- ☐ **Instructing** — Teaching others how to do something.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Speaking** — Talking to others to convey information effectively.

ABILITIES

- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Selective Attention** — The ability to concentrate on a task over a period of time without being distracted.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Written Expression** — The ability to communicate information and ideas in writing so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Leadership** — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Self Control** — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- | | |
|---|--|
| ☐ Blasting/Blaster | ☐ Building/Home/Construction Inspection/Inspector |
| ☐ Building/Construction Finishing, Management, and Inspection, Other | ☐ Building/Property Maintenance and Management |
| ☐ Building/Construction Site Management/Manager | ☐ Carpentry/Carpenter |

INDUSTRIAL ENGINEER

17-2112.00

EMERGING SECTOR RANKING: #2 in Advanced Electronics and Controls

OCCUPATION DESCRIPTION	Design, develop, test, and evaluate integrated systems for managing industrial production processes including human work factors, quality control, inventory control, logistics and material flow, cost analysis, and production coordination.
OTHER REPORTED JOB TITLES	Design, develop, test, and evaluate integrated systems for managing industrial production processes including human work factors, quality control, inventory control, logistics and material flow, cost analysis, and production coordination.

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18: 7.09%
County Occupational Growth: 262
07 Median Hourly Earnings: \$39.12

Education Level: Bachelor's degree

TASKS

- ☐ Analyze statistical data and product specifications to determine standards and establish quality and reliability objectives of finished product.
- ☐ Develop manufacturing methods, labor utilization standards, and cost analysis systems to promote efficient staff and facility utilization.
- ☐ Recommend methods for improving utilization of personnel, material, and utilities.
- ☐ Plan and establish sequence of operations to fabricate and assemble parts or products and to promote efficient utilization.
- ☐ Apply statistical methods and perform mathematical calculations to determine manufacturing processes, staff requirements, and production standards.
- ☐ Coordinate quality control objectives and activities to resolve production problems, maximize product reliability, and minimize cost.
- ☐ Confer with vendors, staff, and management personnel regarding purchases, procedures, product specifications, manufacturing capabilities, and project status.
- ☐ Draft and design layout of equipment, materials, and workspace to illustrate maximum efficiency using drafting tools and computer.
- ☐ Review production schedules, engineering specifications, orders, and related information to obtain knowledge of manufacturing methods, procedures, and activities.
- ☐ Communicate with management and user personnel to develop production and design standards.

TOP COMPETENCIES FOR INDUSTRIAL ENGINEERS

Active Learning	Active Listening	Complex Problem Solving	Critical Thinking	Engineering and Technology	English Language	Judgment and Decision Making	Mathematics	Reading Comprehension
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Hydraulic motors — Hydraulic power units
- ☐ Integrated motion control systems — Motion control systems
- ☐ Microcontrollers — Programmable logic controllers PLC
- ☐ Sound measuring apparatus or decibel meter — Noise-logging dosimeters; Sound level calibrators; Sound level meters
- ☐ Turntables — Programmable logic controller PLC controlled turntables

Technology used in this occupation:

- ☐ Analytical or scientific software — SAS software; The Mathworks MATLAB; Windward Technologies GRG2; Workcell simulation software
- ☐ Computer aided design CAD software — Autodesk AutoCAD; Facilities planning software; Main Injector Neutrino Oscillation Search MINOS software *; SolidWorks CAD
- ☐ Development environment software — Microsoft Visual Basic; Microsoft Visual Basic Scripting Edition VBScript; Microsoft Visual Studio; National Instruments LabVIEW
- ☐ Industrial control software — Computer numerical control CNC software; Human machine interface HMI software; Nupro CastView; Quality control software
- ☐ Project management software — Microsoft Project; Personnel scheduling software; Process reengineering software; Yield management systems

KNOWLEDGE

- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ **Design** — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ **Mechanical** — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ **Production and Processing** — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and

distribution of goods.

- ☐ Clerical — Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology.
- ☐ Education and Training — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.

SKILLS

- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Writing** — Communicating effectively in writing as appropriate for the needs of the audience.

ABILITIES

- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Mathematical Reasoning** — The ability to choose the right mathematical methods or formulas to solve a problem.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Visualization** — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Innovation** — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Leadership** — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Industrial Engineering

MECHANICAL ENGINEERS

17-2141.00

EMERGING SECTOR RANKING: #1 in Advanced Materials and Chemicals
#2 in Robotics and Automation

OCCUPATION DESCRIPTION	Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment. Oversee installation, operation, maintenance, and repair of such equipment as centralized heat, gas, water, and steam systems.
OTHER REPORTED JOB TITLES	Mechanical Engineer, Equipment Engineer, Product Engineer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	1.97%
County Occupational Growth:	120
07 Median Hourly Earnings:	\$40.20
Education Level:	Bachelor's degree

TASKS

- ☐ Read and interpret blueprints, technical drawings, schematics, and computer-generated reports.
- ☐ Confer with engineers and other personnel to implement operating procedures, resolve system malfunctions, and provide technical information.
- ☐ Research and analyze customer design proposals, specifications, manuals, and other data to evaluate the feasibility, cost, and maintenance requirements of designs or applications.
- ☐ Specify system components or direct modification of products to ensure conformance with engineering design and performance specifications.
- ☐ Research, design, evaluate, install, operate, and maintain mechanical products, equipment, systems and processes to meet requirements, applying knowledge of engineering principles.
- ☐ Investigate equipment failures and difficulties to diagnose faulty operation, and to make recommendations to maintenance crew.
- ☐ Assist drafters in developing the structural design of products using drafting tools or computer-assisted design (CAD) or drafting equipment and software.
- ☐ Provide feedback to design engineers on customer problems and needs.
- ☐ Oversee installation, operation, maintenance, and repair to ensure that machines and equipment are installed and functioning according to specifications.
- ☐ Conduct research that tests and analyzes the feasibility, design, operation and performance of equipment, components and systems.

TOP COMPETENCIES FOR MECHANICAL ENGINEERS

Active Listening	Complex Problem Solving	Critical Thinking	Engineering and Technology	English Language	Judgment and Decision Making	Mathematics	Reading Comprehension	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Cold forming presses-Fused deposition modeling machines; Rapid thermal processing systems
- ☐ Flowmeters-Digital particle image velocimeters; Laser Doppler anemometers; Laser Doppler velocimeters LDV; Pitot tubes
- ☐ Interferometers-Interferometric microscopes; Spectrum analyzers
- ☐ Machine mounts or vibration isolators-Vibration control systems; Vibration isolators
- ☐ Semiconductor process systems-Spin-coaters; Wafer bonding systems; Wafer dicing saws; Wire bonders

Technology used in this occupation:

- ☐ Analytical or scientific software-Sigmetrix CETOL 6 Sigma; Statistical analysis software; Statistical energy analysis SEA software; The Mathworks MATLAB
- ☐ Computer aided design CAD software-Autodesk AutoCAD; SolidWorks CAD; UGS I-DEAS; Zeemax software
- ☐ Development environment software-Ladder Logic; Microsoft Visual Basic; National Instruments LabVIEW; Rockwell Software
- ☐ Industrial control software-Computer numerical control CNC software; Human machine interface HMI software
- ☐ Object or component oriented development software-C++; G-code

KNOWLEDGE

- ☐ **Engineering and Technology**-Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **English Language**-Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics**-Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Administration and Management**-Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Computers and Electronics**-Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

- ☐ Design-Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ Mechanical-Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- ☐ Physics-Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub- atomic structures and processes.
- ☐ Production and Processing-Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ **Active Listening**-Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving**-Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Critical Thinking**-Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making**-Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Mathematics**-Using mathematics to solve problems.
- ☐ **Reading Comprehension**-Understanding written sentences and paragraphs in work related documents.
- ☐ **Time Management** -Managing one's own time and the time of others.
- ☐ Science-Using scientific rules and methods to solve problems.
- ☐ Speaking-Talking to others to convey information effectively.
- ☐ Writing-Communicating effectively in writing as appropriate for the needs of the audience.

ABILITIES

- ☐ Deductive Reasoning-The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Flexibility of Closure-The ability to identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.
- ☐ Inductive Reasoning-The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Information Ordering-The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Intercultural Awareness-The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence-The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence-The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity-The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Near Vision-The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension-The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression -The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity-The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity-The ability to speak clearly so others can understand you.
- ☐ Written Comprehension-The ability to read and understand information and ideas presented in writing.

ATTRIBUTES

- ☐ Achievement/Effort-Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Adaptability/Flexibility-Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Analytical Thinking-Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Attention to Detail-Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation -Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability-Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Initiative-Job requires a willingness to take on responsibilities and challenges.
- ☐ Innovation-Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- ☐ Integrity-Job requires being honest and ethical.
- ☐ Leadership-Job requires a willingness to lead, take charge, and offer opinions and direction.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Mechanical Engineering

MEDICAL SCIENTISTS, EXCEPT EPIDEMIOLOGISTS

19-1042.00

EMERGING SECTOR RANKING: #4 in Biotechnology

OCCUPATION DESCRIPTION	Conduct research dealing with the understanding of human diseases and the improvement of human health. Engage in clinical investigation or other research, production, technical writing, or related activities.
OTHER REPORTED JOB TITLES	Scientist, Investigator, Laboratory Director, Post-Doctoral Fellow, Research Associate, Clinical Laboratory Scientist, Clinical Pharmacologist, Clinical Research Director, Clinical Research Scientist, Medical Affairs Director

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	13.65%
County Occupational Growth:	34
07 Median Hourly Earnings:	\$46.67
Education Level:	Doctoral degree

TASKS

- ☐ Conduct research to develop methodologies, instrumentation and procedures for medical application, analyzing data and presenting findings.
- ☐ Plan and direct studies to investigate human or animal disease, preventive methods, and treatments for disease.
- ☐ Follow strict safety procedures when handling toxic materials to avoid contamination.
- ☐ Evaluate effects of drugs, gases, pesticides, parasites, and microorganisms at various levels.
- ☐ Teach principles of medicine and medical and laboratory procedures to physicians, residents, students, and technicians.
- ☐ Prepare and analyze organ, tissue and cell samples to identify toxicity, bacteria, or microorganisms, or to study cell structure.
- ☐ Standardize drug dosages, methods of immunization, and procedures for manufacture of drugs and medicinal compounds.
- ☐ Investigate cause, progress, life cycle, or mode of transmission of diseases or parasites.
- ☐ Confer with health department, industry personnel, physicians, and others to develop health safety standards and public health improvement programs.
- ☐ Study animal and human health and physiological processes.

TOP COMPETENCIES FOR MEDICAL SCIENTISTS, EXCEPT EPIDEMIOLOGISTS

Biology

Chemistry

English Language

TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Benchtop centrifuges — Automated centrifuges; Centrifuges; High-speed centrifuges; Tabletop centrifuges
- ☐ Laboratory flasks — Erlenmeyer flasks; Flasks; Volumetric flasks
- ☐ Manual or electronic hematology differential cell counters — Coulter counters; Differential counters; Flow cytometers
- ☐ Refrigerated benchtop centrifuges — Refrigerated centrifuges; Refrigerated swinging bucket centrifuges
- ☐ Spectrophotometers — Atomic absorption AA spectrophotometers; Cold vapor atomic absorption spectrophotometers; Recording spectrophotometers; Ultraviolet-Visible UV/VIS spectrophotometers

Technology used in this occupation:

- ☐ Analytical or scientific software — BioArray Software Environment BASE software; Medical Scientists MediSave; The Mathworks MATLAB; Waters Q-DIS/QM LIMS
- ☐ Data base user interface and query software — Database software; Waters eLab Notebook; Waters Empower 2
- ☐ Graphics or photo imaging software — Adobe Photoshop
- ☐ Spreadsheet software — Microsoft Excel
- ☐ Word processing software — Microsoft Word

KNOWLEDGE

- ☐ **Biology** — Knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
- ☐ **Chemistry** — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Clerical** — Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology.
- ☐ **Communications and Media** — Knowledge of media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.
- ☐ **Education and Training** — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement

of training effects.

- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ Medicine and Dentistry — Knowledge of the information and techniques needed to diagnose and treat human injuries, diseases, and deformities. This includes symptoms, treatment alternatives, drug properties and interactions, and preventive health-care measures.
- ☐ Personnel and Human Resources — Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems.

SKILLS

- ☐ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ Instructing — Teaching others how to do something.
- ☐ Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ☐ Science — Using scientific rules and methods to solve problems.
- ☐ Time Management — Managing one's own time and the time of others.
- ☐ Writing — Communicating effectively in writing as appropriate for the needs of the audience.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Written Expression — The ability to communicate information and ideas in writing so others will understand.

ATTRIBUTES

- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Persistence — Job requires persistence in the face of obstacles.
- ☐ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- | | | | |
|---|--|---|---|
| ☐ Anatomy | ☐ Biostatistics | ☐ Endocrinology | ☐ Human/Medical Genetics |
| ☐ Biochemistry | ☐ Cardiovascular Science | ☐ Environmental Toxicology | |
| ☐ Biomedical Sciences, General | ☐ Cell Physiology | ☐ Epidemiology | |
| ☐ Biophysics | ☐ Cell/Cellular Biology and Histology | ☐ Exercise Physiology | |

NETWORK AND COMPUTER SYSTEMS ADMINISTRATORS

15-1071.00

EMERGING SECTOR RANKING: #3 in Homeland Security

OCCUPATION DESCRIPTION	Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet system or a segment of a network system. Maintain network hardware and software. Monitor network to ensure network availability to all system users and perform necessary maintenance to support network availability. May supervise other network support and client server specialists and plan, coordinate, and implement network security measures.
OTHER REPORTED JOB TITLES	Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet system or a segment of a network system. Maintain network hardware and software. Monitor network to ensure network availability to all system

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	21.34%
County Occupational Growth:	464
07 Median Hourly Earnings:	\$31.64
Education Level:	Bachelor's degree

TASKS

- ☐ Diagnose hardware and software problems, and replace defective components.
- ☐ Perform data backups and disaster recovery operations.
- ☐ Maintain and administer computer networks and related computing environments including computer hardware, systems software, applications software, and all configurations.
- ☐ Plan, coordinate, and implement network security measures to protect data, software, and hardware.
- ☐ Operate master consoles to monitor the performance of computer systems and networks, and to coordinate computer network access and use.
- ☐ Perform routine network startup and shutdown procedures, and maintain control records.
- ☐ Design, configure, and test computer hardware, networking software and operating system software.
- ☐ Recommend changes to improve systems and network configurations, and determine hardware or software requirements related to such changes.
- ☐ Confer with network users about how to solve existing system problems.
- ☐ Monitor network performance to determine whether adjustments need to be made, and to determine where changes will need to be made in the future.

TOP COMPETENCIES FOR NETWORK AND COMPUTER SYSTEMS ADMINISTRATORS

Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Education and Training	Engineering and Technology	English Language	Mathematics	Reading Comprehension	Troubleshooting
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Network analyzers — Asynchronous transfer mode ATM analyzers; Bit error rate BER testers; Synchronous optical network SONET analyzers; T-Birds
- ☐ Cable accessories — Cable verifiers
- ☐ Interferometers — Optical spectrum analyzers
- ☐ Power meters — Powerline monitors
- ☐ Protocol analyzers

Technology used in this occupation:

- ☐ Administration software — Cisco Systems CiscoWorks; Element management software; Network management software; Network shutdown software
- ☐ Network monitoring software — Ethereal; Multi-router traffic grapher MRTG software; Veritas NerveCenter; ZABBIX software
- ☐ Network security or virtual private network VPN management software — Intrusion prevention system IPS software; Network and system vulnerability assessment software; OpenService Open NerveCenter; Security incident handling software
- ☐ Transaction security and virus protection software — Encryption software; Packet filter software; Ping software; Root kit detection software
- ☐ Configuration management software — Application management software; Automated installation software; Patch and update management software; Systems and applications migration software

KNOWLEDGE

- ☐ **Education and Training** — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.
- ☐ **Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

- ☐ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ Telecommunications — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.
- ☐ Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Troubleshooting** — Determining causes of operating errors and deciding what to do about it.
- ☐ **Equipment Selection** — Determining the kind of tools and equipment needed to do a job.
- ☐ **Service Orientation** — Actively looking for ways to help people.
- ☐ **Installation** — Installing equipment, machines, wiring, or programs to meet specifications.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.

ABILITIES

- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Finger Dexterity** — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- ☐ **Flexibility of Closure** — The ability to identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ **Analytical Thinking** — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

RELATED INSTRUCTIONAL PROGRAMS

- | | |
|--|---|
| ☐ Computer Systems Analysis/Analyst | ☐ Computer and Information Sciences, General |
| ☐ Computer Systems Networking and Telecommunications | ☐ Computer and Information Systems Security |
| ☐ Computer and Information Sciences and Support Services, Other | ☐ Information Science |

PERSONAL FINANCIAL ADVISOR

13-2052.00

EMERGING SECTOR RANKING: #5 in Financial Services

OCCUPATION DESCRIPTION	Advise clients on financial plans utilizing knowledge of tax and investment strategies, securities, insurance, pension plans, and real estate. Duties include assessing clients' assets, liabilities, cash flow, insurance coverage, tax status, and financial objectives to establish investment strategies.
OTHER REPORTED JOB TITLES	Financial Advisor, Portfolio Manager, Financial Planner, Account Executive, Registered Representative, Investment Advisor, Financial Consultant, Financial Counselor, Analyst, Certified Financial Planner (CFP)

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	28.65%
County Occupational Growth:	389
07 Median Hourly Earnings:	\$30.15
Education Level:	Bachelor's degree

TASKS

- ☐ Sell financial products such as stocks, bonds, mutual funds, and insurance if licensed to do so.
- ☐ Build and maintain client bases, keeping current client plans up-to-date and recruiting new clients on an ongoing basis.
- ☐ Analyze financial information obtained from clients to determine strategies for meeting clients' financial objectives.
- ☐ Answer clients' questions about the purposes and details of financial plans and strategies.
- ☐ Review clients' accounts and plans regularly to determine whether life changes, economic changes, or financial performance indicate a need for plan reassessment.
- ☐ Interview clients to determine their current income, expenses, insurance coverage, tax status, financial objectives, risk tolerance, and other information needed to develop a financial plan.
- ☐ Recommend strategies clients can use to achieve their financial goals and objectives, including specific recommendations in such areas as cash management, insurance coverage, and investment planning.
- ☐ Implement financial planning recommendations, or refer clients to someone who can assist them with plan implementation.
- ☐ Research and investigate available investment opportunities to determine whether they fit into financial plans.
- ☐ Explain and document for clients the types of services that are to be provided, and the responsibilities to be taken by the personal financial advisor.

TOP COMPETENCIES FOR PERSONAL FINANCIAL ADVISOR

Active Learning	Active Listening	Critical Thinking	Customer and Personal Service	English Language	Judgment and Decision Making	Reading Comprehension	Speaking	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Personal digital assistant PDAs or organizers
- ☐ Desktop computers
- ☐ Notebook computers
- ☐ Tablet computers
- ☐ Personal computers

Technology used in this occupation:

- ☐ Presentation software-Financial planning presentation software; Microsoft PowerPoint; MoneyTree Silver Financial Planner (presentation feature)
- ☐ Word processing software-Automatic Data Processing ProxyEdge; Financial report generation software; Microsoft Word
- ☐ Customer relationship management CRM software-ACT! ACT4Advisors; CRM Software Junxure-i; Redtail Technology Our Business Online; Web Information Solutions Pocket Informant
- ☐ Document management software-Finaceware Finance File Manager; ScanSoft PaperPort Pro; SunGard LockBox; WORLDQX software
- ☐ Financial analysis software-AdviceAmerica AdvisorVision; Finance Logix Retirement Planner; Torrid Retirement Planner; WealthTec WealthMaster

KNOWLEDGE

- ☐ **Customer and Personal Service**-Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **English Language**-Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Economics and Accounting**-Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
- ☐ **Sales and Marketing**-Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques, and sales control systems.

- ☐ Computers and Electronics-Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ Mathematics -Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

SKILLS

- ☐ **Active Learning**-Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Active Listening**-Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Critical Thinking**-Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making**-Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Reading Comprehension**-Understanding written sentences and paragraphs in work related documents.
- ☐ **Speaking**-Talking to others to convey information effectively.
- ☐ **Time Management**-Managing one's own time and the time of others.
- ☐ **Management of Financial Resources**-Determining how money will be spent to get the work done, and accounting for these expenditures.
- ☐ **Service Orientation**-Actively looking for ways to help people.
- ☐ **Mathematics**-Using mathematics to solve problems.

ABILITIES

- ☐ **Deductive Reasoning** -The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Inductive Reasoning** -The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Awareness**-The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Sensitivity**-The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Number Facility** -The ability to add, subtract, multiply, or divide quickly and correctly.
- ☐ **Oral Expression**-The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity**-The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Speech Clarity** -The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition**-The ability to identify and understand the speech of another person.
- ☐ **Written Comprehension** -The ability to read and understand information and ideas presented in writing.
- ☐ **Written Expression** -The ability to communicate information and ideas in writing so others will understand.
- ☐ **Intercultural Intelligence**-The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Oral Comprehension**-The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Intercultural Competence**-The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.

ATTRIBUTES

- ☐ **Achievement/Effort**-Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ **Analytical Thinking**-Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ **Attention to Detail**-Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Dependability**-Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence**-Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative**-Job requires a willingness to take on responsibilities and challenges.
- ☐ **Persistence**-Job requires persistence in the face of obstacles.
- ☐ **Self Control**-Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Stress Tolerance**-Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Integrity**-Job requires being honest and ethical.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Finance, General
- ☐ Financial Planning and Services

SALES AGENTS, FINANCIAL SERVICES

41-3031.02

EMERGING SECTOR RANKING: #1 in Financial Services

OCCUPATION DESCRIPTION	Sell financial services, such as loan, tax, and securities counseling to customers of financial institutions and business establishments.
OTHER REPORTED JOB TITLES	Financial Consultant, Financial Specialist, Investment Officer, Relationship Manager, Select Banker, Client Manager, Financial Services Representative, Relationship Banker, Sales Representative

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	17.63%
County Occupational Growth:	336
07 Median Hourly Earnings:	\$34.10
Education Level:	Bachelor's degree

TASKS

- ☐ Determine customers' financial services needs, and prepare proposals to sell services that address these needs.
- ☐ Contact prospective customers in order to present information and explain available services.
- ☐ Sell services and equipment, such as trusts, investments, and check processing services.
- ☐ Prepare forms or agreements to complete sales.
- ☐ Develop prospects from current commercial customers, referral leads, and sales and trade meetings.
- ☐ Review business trends in order to advise customers regarding expected fluctuations.
- ☐ Make presentations on financial services to groups in order to attract new clients.
- ☐ Evaluate costs and revenue of agreements in order to determine continued profitability.

TOP COMPETENCIES FOR SALES AGENTS, FINANCIAL SERVICES

Active Listening	Administration and Management	Critical Thinking	Customer and Personal Service	English Language	Judgment and Decision Making	Reading Comprehension	Speaking	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Calculators or accessories — 10-key calculators
- ☐ Personal computers
- ☐ Desktop computers
- ☐ Notebook computers

Technology used in this occupation:

- ☐ Electronic mail software — Email software; IBM Lotus Notes; Microsoft Outlook
- ☐ Spreadsheet software — Microsoft Excel
- ☐ Word processing software — Microsoft Word
- ☐ Financial analysis software — Bloomberg Professional; Financial needs analysis software; Realm Business Solutions INSIGHT for ARGUS; Sales analysis software
- ☐ Project management software
- ☐ Data base user interface and query software — Data entry software; FileMaker Pro; Microsoft Access; Web-based information systems

KNOWLEDGE

- ☐ **Administration and Management** — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Economics and Accounting** — Knowledge of economic & accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.
- ☐ **Law and Government** — Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- ☐ **Sales and Marketing** — Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques, and sales control systems.
- ☐ **Computers and Electronics** — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ **Judgment and Decision Making** — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Monitoring** — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ☐ **Persuasion** — Persuading others to change their minds or behavior.
- ☐ **Service Orientation** — Actively looking for ways to help people.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.

ABILITIES

- ☐ **Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ **Inductive Reasoning** — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Written Comprehension** — The ability to read and understand information and ideas presented in writing.
- ☐ **Written Expression** — The ability to communicate information and ideas in writing so others will understand.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).

ATTRIBUTES

- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Independence** — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ **Initiative** — Job requires a willingness to take on responsibilities and challenges.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Leadership** — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ **Persistence** — Job requires persistence in the face of obstacles.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Achievement/Effort** — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Business and Personal/Financial Services Marketing Operations
- ☐ Financial Planning and Services
- ☐ Investments and Securities

SALES REPRESENTATIVES, WHOLESALE AND MANUFACTURING, TECHNICAL AND SCIENTIFIC PRODUCTS

41-4011.00

EMERGING SECTOR RANKING: #1 in Advanced Electronics and Controls
#2 in Robotics and Automation
#3 in Advanced Materials and Chemicals
#3 in Biotechnology

OCCUPATION DESCRIPTION	Sell goods for wholesalers or manufacturers where technical or scientific knowledge is required in such areas as biology, engineering, chemistry, and electronics, normally obtained from at least 2 years of post-secondary education.
OTHER REPORTED JOB TITLES	Sales Representative, Account Manager, Sales Manager, Inside Sales Representative, Account Development Manager, Account Executive, Channel Sales Director, Marketing Representative, Sales Director, Distribution Sales Manager

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	20.88%
County Occupational Growth:	757
07 Median Hourly Earnings:	\$40.68
Education Level:	Moderate-term on-the-job training

TASKS

- ☐ Contact new and existing customers to discuss their needs, and to explain how these needs could be met by specific products and services.
- ☐ Answer customers' questions about products, prices, availability, product uses, and credit terms.
- ☐ Quote prices, credit terms and other bid specifications.
- ☐ Emphasize product features based on analyses of customers' needs, and on technical knowledge of product capabilities and limitations.
- ☐ Negotiate prices and terms of sales and service agreements.
- ☐ Maintain customer records, using automated systems.
- ☐ Identify prospective customers by using business directories, following leads from existing clients, participating in organizations and clubs, and attending trade shows and conferences.
- ☐ Prepare sales contracts for orders obtained, and submit orders for processing.
- ☐ Select the correct products or assist customers in making product selections, based on customers' needs, product specifications, and applicable regulations.
- ☐ Collaborate with colleagues to exchange information such as selling strategies and marketing information.

TOP COMPETENCIES FOR SALES REPRESENTATIVES, WHOLESALE & MANUFACTURING, TECHNICAL & SCIENTIFIC PRODUCTS

English Language

Sales and Marketing

Customer and Personal Service

TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Notebook computers — Laptop computers
- ☐ Personal digital assistant PDAs or organizers — Personal digital assistants PDA
- ☐ Personal computers
- ☐ Tablet computers

Technology used in this occupation:

- ☐ Spreadsheet software — Microsoft Excel
- ☐ Word processing software — Microsoft Word
- ☐ Electronic mail software — IBM Lotus Notes; Microsoft Exchange; Microsoft Outlook
- ☐ Presentation software — Microsoft PowerPoint
- ☐ Customer relationship management CRM software — FrontRange Solutions Goldmine; NetSuite NetCRM; Sybase iAnywhere Pharma Anywhere; Sybase iAnywhere Sales Anywhere
- ☐ Enterprise resource planning ERP software — Infor SyteLine ERP

KNOWLEDGE

- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Sales and Marketing** — Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques, and sales control systems.
- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **Production and Processing** — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

SKILLS

- ☐ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ Negotiation — Bringing others together and trying to reconcile differences.
- ☐ Persuasion — Persuading others to change their minds or behavior.
- ☐ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ☐ Service Orientation — Actively looking for ways to help people.
- ☐ Social Perceptiveness — Being aware of others' reactions and understanding why they react as they do.
- ☐ Speaking — Talking to others to convey information effectively.
- ☐ Time Management — Managing one's own time and the time of others.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Speech Clarity — The ability to speak clearly so others can understand you.
- ☐ Speech Recognition — The ability to identify and understand the speech of another person.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Written Expression — The ability to communicate information and ideas in writing so others will understand.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.

ATTRIBUTES

- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Persistence — Job requires persistence in the face of obstacles.
- ☐ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Business, Management, Marketing, and Related Support Services, Other
- ☐ Selling Skills and Sales Operations

TEAM ASSEMBLERS

51-2092.00

EMERGING SECTOR RANKING: #2 in Medical Devices

OCCUPATION DESCRIPTION	Work as part of a team having responsibility for assembling an entire product or component of a product. Team assemblers can perform all tasks conducted by the team in the assembly process and rotate through all or most of them rather than being assigned to a specific task on a permanent basis. May participate in making management decisions affecting the work. Team leaders who work as part of the team should be included.
OTHER REPORTED JOB TITLES	Assembler, Assembly Line Machine Operator, Assembly Operator, Assembly Line Worker, Assembly Associate, Certified Composites Technician (CCT), Operator Technician, Production Line Worker, Assembly Inspector, Assembly Technician

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	-13.29%
County Occupational Growth:	-648
07 Median Hourly Earnings:	\$11.80
Education Level:	Moderate-term on-the-job training

TASKS

- ☐ Rotate through all the tasks required in a particular production process.
- ☐ Determine work assignments and procedures.
- ☐ Shovel and sweep work areas.
- ☐ Operate heavy equipment such as forklifts.
- ☐ Provide assistance in the production of wiring assemblies.

TOP COMPETENCIES FOR TEAM ASSEMBLERS

Active Listening

Coordination

Equipment Maintenance

Equipment Selection

Instructioning

TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Rivet tools — Alligator jaw compression riveters; Metal bucking bars; Recoilless rivet hammers; Rivet guns
- ☐ Specialty wrenches — Case wrenches; Gear wrenches; Input wrenches; Spline wrenches
- ☐ Torque wrenches — Fuel control wrenches; Torque drivers; Trunnion wrenches
- ☐ Tube bending machinery — Beading tools; Metal bending equipment; Roll benders; Tube benders
- ☐ Workshop presses — Brakes; Computerized numerical control CNC press brakes; Drill presses; Straightening presses

Technology used in this occupation:

- ☐ Computer aided design CAD software
- ☐ Data base user interface and query software — Data entry software
- ☐ Office suite software — Microsoft Office
- ☐ Spreadsheet software — Microsoft Excel
- ☐ Word processing software — Microsoft Word

KNOWLEDGE

- ☐ Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Coordination** — Adjusting actions in relation to others' actions.
- ☐ **Equipment Maintenance** — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- ☐ **Equipment Selection** — Determining the kind of tools and equipment needed to do a job.
- ☐ **Instructioning** — Teaching others how to do something.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Learning Strategies** — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.
- ☐ **Operation Monitoring** — Watching gauges, dials, or other indicators to make sure a machine is working properly.

- ☐ Quality Control Analysis — Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- ☐ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.

ABILITIES

- ☐ Arm-Hand Steadiness — The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
- ☐ Control Precision — The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Finger Dexterity — The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Manual Dexterity — The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Expression — The ability to communicate information and ideas in speaking so others will understand.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Intercultural Awareness—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ Intercultural Competence—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ Intercultural Intelligence—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ Intercultural Sensitivity—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.

ATTRIBUTES

- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Concern for Others — Job requires being sensitive to others' needs and feelings and being understanding and helpful on the job.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Self Control — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Not Applicable

TELLERS

43-3071.00

EMERGING SECTOR RANKING: #3 in Financial Services

OCCUPATION DESCRIPTION	Receive and pay out money. Keep records of money and negotiable instruments involved in a financial institution's various transactions.
OTHER REPORTED JOB TITLES	Teller, Customer Service Representative (CSR), Bank Teller, Member Services Representative, Account Representative, Customer Service Associate (CSA), Personal Banking Representative, Roving Teller, Teller Coordinator

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	8.55%
County Occupational Growth:	311
07 Median Hourly Earnings:	\$11.72
Education Level:	Short-term on-the-job training

TASKS

- ☐ Balance currency, coin, and checks in cash drawers at ends of shifts, and calculate daily transactions using computers, calculators, or adding machines.
- ☐ Cash checks and pay out money after verifying that signatures are correct, that written and numerical amounts agree, and that accounts have sufficient funds.
- ☐ Receive checks and cash for deposit, verify amounts, and check accuracy of deposit slips.
- ☐ Examine checks for endorsements and to verify other information such as dates, bank names, identification of the persons receiving payments and the legality of the documents.
- ☐ Enter customers' transactions into computers to record transactions and issue computer-generated receipts.
- ☐ Count currency, coins, and checks received, by hand or using currency-counting machine, to prepare them for deposit or shipment to branch banks or the Federal Reserve Bank.
- ☐ Identify transaction mistakes when debits and credits do not balance.
- ☐ Prepare and verify cashier's checks.
- ☐ Arrange monies received in cash boxes and coin dispensers according to denomination.
- ☐ Process transactions such as term deposits, retirement savings plan contributions, automated teller transactions, night deposits, and mail deposits.

TOP COMPETENCIES FOR TELLERS

Active Listening	Customer and Personal Service	English Language	Mathematics	Monitoring	Reading Comprehension	Service Orientation	Social Perceptiveness	Speaking	Time Management
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TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Alarm systems — Teller alarms; Vault security alarms
- ☐ Check endorsing machines — Check encoders; Official check imprinters
- ☐ Desktop computers
- ☐ Multi function printers — Check validation printers; Journal printers; Passbook printers
- ☐ Personal computers

Technology used in this occupation:

- ☐ Electronic mail software — Microsoft Outlook
- ☐ Enterprise resource planning ERP software — Jack Henry & Associates Vertex
- ☐ Office suite software — Microsoft Office Accounting software — Information Technology Incorporated Premier Teller; Southern Data Systems TellerPro
- ☐ Document management software — Hyland Software OnBase; ISCheck software

KNOWLEDGE

- ☐ **Customer and Personal Service** — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ **English Language** — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ **Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

SKILLS

- ☐ **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- ☐ **Mathematics** — Using mathematics to solve problems.
- ☐ **Monitoring** — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- ☐ **Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.
- ☐ **Service Orientation** — Actively looking for ways to help people.
- ☐ **Social Perceptiveness** — Being aware of others' reactions and understanding why they react as they do.
- ☐ **Speaking** — Talking to others to convey information effectively.
- ☐ **Time Management** — Managing one's own time and the time of others.
- ☐ **Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

ABILITIES

- ☐ **Number Facility** — The ability to add, subtract, multiply, or divide quickly and correctly.
- ☐ **Oral Comprehension** — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ **Oral Expression** — The ability to communicate information and ideas in speaking so others will understand.
- ☐ **Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ **Speech Clarity** — The ability to speak clearly so others can understand you.
- ☐ **Speech Recognition** — The ability to identify and understand the speech of another person.
- ☐ **Intercultural Awareness**—The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
- ☐ **Intercultural Sensitivity**—The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
- ☐ **Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ **Intercultural Competence**—The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist.
- ☐ **Intercultural Intelligence**—The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
- ☐ **Mathematical Reasoning** — The ability to choose the right mathematical methods or formulas to solve a problem.
- ☐ **Near Vision** — The ability to see details at close range (within a few feet of the observer).
- ☐ **Perceptual Speed** — The ability to quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.

ATTRIBUTES

- ☐ **Attention to Detail** — Job requires being careful about detail and thorough in completing work tasks.
- ☐ **Cooperation** — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ **Dependability** — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ **Integrity** — Job requires being honest and ethical.
- ☐ **Self Control** — Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.
- ☐ **Social Orientation** — Job requires preferring to work with others rather than alone, and being personally connected with others on the job.
- ☐ **Stress Tolerance** — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ **Concern for Others** — Job requires being sensitive to others' needs and feelings and being understanding and helpful on the job.
- ☐ **Leadership** — Job requires a willingness to lead, take charge, and offer opinions and direction.
- ☐ **Adaptability/Flexibility** — Job requires being open to change (positive or negative) and to considerable variety in the workplace.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ **Banking and Financial Support Services**

WEB DEVELOPER*

15-1099.04

EMERGING SECTOR RANKING: #4 in Communications and Information Technology

OCCUPATION DESCRIPTION	Develop and design web applications and web sites. Create and specify architectural and technical parameters. Direct web site content creation, enhancement and maintenance.
OTHER REPORTED JOB TITLES	Webmaster, Web Designer, Web Developer

COUNTY QUICK FACTS

Oakland County Growth Rate 08-18:	11.38%
County Occupational Growth:	284
07 Median Hourly Earnings:	\$31.07
Education Level:	Associate degree

TASKS

- ☐ Design, build, or maintain web sites, using authoring or scripting languages, content creation tools, management tools, and digital media.
- ☐ Perform or direct web site updates.
- ☐ Write, design, or edit web page content, or direct others producing content.
- ☐ Confer with management or development teams to prioritize needs, resolve conflicts, develop content criteria, or choose solutions.
- ☐ Back up files from web sites to local directories for instant recovery in case of problems.
- ☐ Identify problems uncovered by testing or customer feedback, and correct problems or refer problems to appropriate personnel for correction.
- ☐ Evaluate code to ensure that it is valid, is properly structured, meets industry standards and is compatible with browsers, devices, or operating systems.
- ☐ Maintain understanding of current web technologies or programming practices through continuing education, reading, or participation in professional conferences, workshops, or groups.
- ☐ Analyze user needs to determine technical requirements.
- ☐ Develop or validate test routines and schedules to ensure that test cases mimic external interfaces and address all browser and device types.

TOOLS AND TECHNOLOGY

Tools used in this occupation:

- ☐ Computer servers — Application servers; Web servers
- ☐ Desktop computers
- ☐ High capacity removable media drives — Universal serial bus USB flash drives
- ☐ Notebook computers — Laptop computers
- ☐ Personal computers

Technology used in this occupation:

- ☐ Data base management system software — Microsoft SQL Server; MySQL software; Oracle software
- ☐ Development environment software — IBM Rational Rose; Microsoft Visual SourceSafe; Subversion *; Sun Microsystems Java 2 Platform Enterprise Edition J2EE
- ☐ Graphics or photo imaging software — Adobe Systems Adobe After Effects; Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop software
- ☐ Object or component oriented development software — C++; Microsoft ActiveX; Python; Sun Microsystems Java
- ☐ Web platform development software — Apache Struts; Enterprise JavaBeans; Microsoft Commerce Server; Spring Framework

* Software developed by a government agency and/or distributed as freeware or shareware.

KNOWLEDGE

- ☐ Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- ☐ English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- ☐ Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
- ☐ Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- ☐ Communications and Media — Knowledge of media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.
- ☐ Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

SKILLS

- ☐ Troubleshooting — Determining causes of operating errors and deciding what to do about it.
- ☐ Programming — Writing computer programs for various purposes.
- ☐ Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not

interrupting at inappropriate times.

- ☐ Reading Comprehension — Understanding written sentences and paragraphs in work related documents.
- ☐ Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- ☐ Time Management — Managing one's own time and the time of others.
- ☐ Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- ☐ Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- ☐ Technology Design — Generating or adapting equipment and technology to serve user needs.
- ☐ Operations Analysis — Analyzing needs and product requirements to create a design.

ABILITIES

- ☐ Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.
- ☐ Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- ☐ Category Flexibility — The ability to generate or use different sets of rules for combining or grouping things in different ways.
- ☐ Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
- ☐ Near Vision — The ability to see details at close range (within a few feet of the observer).
- ☐ Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.
- ☐ Speech Recognition — The ability to identify and understand the speech of another person.
- ☐ Written Comprehension — The ability to read and understand information and ideas presented in writing.
- ☐ Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- ☐ Selective Attention — The ability to concentrate on a task over a period of time without being distracted.

ATTRIBUTES

- ☐ Attention to Detail — Job requires being careful about detail and thorough in completing work tasks.
- ☐ Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems.
- ☐ Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations.
- ☐ Integrity — Job requires being honest and ethical.
- ☐ Initiative — Job requires a willingness to take on responsibilities and challenges.
- ☐ Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace.
- ☐ Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.
- ☐ Achievement/Effort — Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.
- ☐ Stress Tolerance — Job requires accepting criticism and dealing calmly and effectively with high stress situations.
- ☐ Innovation — Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.

RELATED INSTRUCTIONAL PROGRAMS

- ☐ Bioinformatics
- ☐ Biomathematics and Bioinformatics, Other
- ☐ Computer Science
- ☐ Computer and Information Sciences and Support Services, Other
- ☐ Computer and Information Sciences, General
- ☐ Data Processing and Data Processing Technology/Technician
- ☐ Information Science/Studies
- ☐ Management Information Systems and Services

*Web Developer is part of Computer Specialists, all other occupation; SOC 15-1099

DATA ANALYSIS METHODOLOGY

DATA SCREENING

As a first step in the data analysis process, all variables were screened to assure that the properties of the data met the assumptions of the statistical procedures to be used. Specifically, data were screened to ensure that there were no errant values (i.e., values that were outside the possible range), that the distribution of values adequately followed the normal bell shaped curve with extreme values occurring with a low frequency and more mid-range values occurring with a high frequency, and that there were no statistical outliers, which are values that are substantially different from the bulk of the values.

Traditional statistical analyses are sensitive to deviations from these distributional properties and if such deviations are not accounted for, the analyses will produce biased results. As the majority of the data collected from this survey were categorical frequency counts, distributional properties are of less concern for the majority of the analyses reported. However, for each job skill reported, respondents were asked to rate “how frequently that skill is used” for a given job, “how important” that skill is for a given job, and “how hard it is to find” someone with that skill. Each of these questions used a five-point Likert scale response format. These response formats exhibit the statistical properties of continuous variables and thus, are sensitive to distributional properties.

The data screening procedures found that all three of these continuous variables had distributional properties which sufficiently approximated those assumed by traditional statistical analyses and so no further adjustments or corrections were made.

MISSING VALUE ANALYSIS

One of the most common concerns with large scale survey data collection is missing data. Missing values occur for a wide array of reasons, but they can be categorized into three broad groups based on their statistical properties. The first is missing completely at random (MCAR). This type of missing data occurs when a respondent does not record a value for some reason that does not occur systematically; for example, the respondent might accidentally skip over a question while reading. The important thing is that the reason they didn’t respond had nothing to do with either their potential response or any characteristic of the respondent. This type of missing data does not negatively impact statistical findings.

The second type of missing data is missing at random (MAR). While this seems an odd distinction from the MCAR category, there is a subtle, but meaningful difference. MAR data might be missing for some systematic reason, such as the order of the question on a survey with the amount of missing data increasing towards the end of the survey, but the pattern of missingness is statistically independent of the potential value of the individual’s response. In other words, a respondent might have chosen not to answer a question for a specific reason, such as fatigue or running out of time, but the reason had nothing to do with the answer they would have given had they answered the question. This type of missing data has less impact on the validity of statistical conclusions and adjustments can be made to the analyses to account for this pattern of missingness.

The third type of missing data is referred to as missing not at random (MNAR). This pattern of missingness is a direct function of the potential value of the missing data. Here the respondent chose not to answer a particular question specifically due to what their answer would have been. This final pattern of missing data is highly detrimental to statistical findings and can not be corrected statistically.

There is a substantial amount of missing data in the present survey results; however, the pattern of missingness was assessed using Little and Rubin's (1987) chi-square test and the data was at least MAR, so statistical results are not negatively impacted by the pattern of missingness. On examination, most of the missingness did appear to be related to the order of questions on the questionnaire, such that as the respondent continued with the survey process they were more likely to skip questions at the end, or end the survey prematurely. Additionally, there did appear to be a considerable amount of missing data that could be considered missing by design. In other words, there were patterns of missing data that were due to the questions not being applicable for a given respondent, given their earlier responses. This is not an uncommon finding in branching survey structures, such as was implemented in this study. While various statistical imputation techniques are available for estimating missing values, there was too much globally missing data to implement them in this dataset. In cases where the data seemed to be missing by design there is no need to impute data in any case. In only one set of reported analyses were missing data of any concern, and it was corrected for within the analyses.

ANALYSIS OF VARIANCE

In order to examine the relationship among the three key questions of; "how important" is a skill, "how frequently" does the employee use that skill, and "how hard is it to find" someone with that skill, we conducted an analysis of variance (ANOVA) for all of the skills noted in the first tier of frequently cited job skills. In every case, the mean rating of how important a skill is was significantly higher than the mean rating for "how hard it is to find" someone with that skill. As can be seen in the ANOVA tables (Appendix F), the mean ratings for "how difficult it is to find" someone with a given skill were around 3 on the 1 to 5 Likert rating scale, with 1 being very easy to find and 5 being very difficult to find. For the "how important" is this skill question the average rating was generally around 4 on the 1 to 5 Likert scale, with 1 being not important and 5 being extremely important. Because of the reversed orientation of the scale anchors (i.e., 1 is desirable for the "difficult to find" question and 5 is desirable for the "importance" question), the finding that the "difficulty finding" question was always statistically significantly lower than the "importance" question. However; it is notable that the mean response to the "difficult to find" question is substantially farther from the optimal extreme rating (i.e., a rating of 1) than the mean response for "importance." This could indicate that respondents felt that it was moderately difficult to find individuals with the skill in question or, that they were not sure how difficult it was to find individuals with that skill and thus were responding in a neutral manner. We also found that the mean ratings of importance tended to decrease in accordance with the overall skill frequency ranking. This provides additional confirmation that the rankings are statistically valid.

CLUSTER ANALYSIS

In order to determine if job groupings could be identified based on statistical groupings of job skills, we conducted a two-stage cluster analysis. This is a statistical procedure for identifying groupings of similar jobs based on statistical similarities among their attributes. The results of this statistical analysis were inconclusive. The findings indicated that there was so much similarity in most job skills that they could not uniquely identify job clusters. However, there were three relatively distinct conceptual clusters of skill sets which emerged from the survey results. These skill clusters can be labeled as analytical/communication, intrapersonal, and knowledge based.

The analytical/communication skills were comprised of such skills as critical thinking, complex problem solving, active learning, and written expression. Because of the high number of non-native English speakers largely working in the computer and engineering fields proficiency in English also emerged as a part of this grouping.

The intrapersonal skill set was comprised of skills such as cooperation, dependability, intercultural sensitivity, and intercultural competence.

Finally, the knowledge based skill set was comprised of skills that are job specific and tied to a specific job task. These skills included skills such as knowledge of database platforms, use of desktop computers, configuration management software, and website development.

In examining the top skills across all jobs, within job sectors, or by specific job, the skills most frequently cited as necessary were predominantly from the analytical/communication and interpersonal skill clusters. One interpretation is that the technical skills associated with a given job represent the minimum skill set to complete the tasks associated with the job, but that the analytical/communication and interpersonal skills are those skills that distinguish individuals that are highly successful within a particular job. Further, these latter skills are less transient in their relative importance. Most of the job specific skills become outdated relatively quickly, especially in technical fields; however, the ability to work with others, to think critically, and to express one's self effectively makes the employee more adaptable to ever changing task requirements and technology and more likely to be successful across industry changes.

THEMES AND RECOMMENDATIONS

THEMES

Top Jobs identified were predominantly technical in nature.

The top jobs identified across all sectors were consistently technical in nature, requiring a command of a wide variety of job-specific “Tools and Technology.” A majority of occupations required an education at the bachelor’s and/or graduate degree level. There continues to be a strong demand for skills in math and science; however, English language skills also appeared within the top tier of required skill set(s) across all sectors with the exception of Biotechnology.

Soft Skills remain the “differentiator” among employees in a workforce dominated by technical jobs.

In examining the top skills across all jobs, within job sectors, or by specific job, the skills most frequently cited as necessary were predominantly from the analytical/communication and interpersonal skill clusters. One interpretation is that the technical skills associated with a given job represent the minimum skill set to complete the tasks associated with the job, but that the analytical/communication and interpersonal skills are those skills that distinguish and/or differentiate individuals that are highly successful within a particular job. Further, these latter skills are less transient in their relative importance. Most of the job specific skills become outdated relatively quickly, especially in technical fields; however, the ability to work with others, to think critically, and to express one’s self effectively makes the employee more adaptable to ever changing task requirements and technology and more likely to be successful across industry changes.

Universally, there is a need for people skills, human interaction abilities, and overall business acumen.

Many managers of Emerging Sector companies indicated a willingness to teach/train employees required “technical skills;” however, employers were unwilling to dedicate the time and resources necessary to address deficiencies in people skills, human interaction abilities, and/or business acumen. With the younger generation relying on various methods of electronic communication – these incoming employees are not acquiring the skills necessary to work effectively with others or, more importantly, with customers. Further, there was overwhelming sentiment regarding the need for “coaching” and training in the areas of appearance, work ethic and business integrity. It was perhaps summed up best by a high level manager at one of the smaller but growing firms within the Medical Devices sector when she indicated that some seminars and workshops need to be developed around the theme “getting back to basics within the workplace.”

Engineers will require interdisciplinary skill sets and experiences.

Multiple employers indicated a widening gap between employer expectations and employee skills sets specifically related to the engineering workforce. Employers need engineers with exposure to and background in more than one area of concentration or specialization. Too often, engineers are “pigeon-holed” into a single area of specialization when the trend in the workplace is moving toward a more diversified engineering skill set. Specifically, emerging sector employers expressed a growing need for engineers with both electrical and mechanical engineering capabilities. This study points to the increasing need for the development of multi-disciplinary curriculums and/or project-based courses/seminars to supplement existing curriculums and regular coursework.

Intercultural Abilities are emerging as an area of increasing importance and heightened awareness.

Intercultural awareness and sensitivity, as well as global languages, emerged as areas of increasing importance and heightened consciousness. This area also further differentiated Oakland County from the occupational statistics gathered at the national level. Moving forward, it will be critical for the County to build upon initiatives such as the Chinese language effort by implementing a strategy to equip new and incumbent employees with the ability to address the intercultural differences that are becoming more prevalent within the global economy.

Project reinforces initiatives underway at some educational institutions.

It was interesting to note that some of the stakeholders viewed the sample profile that was developed as a reinforcement of current efforts and new initiatives already underway at their institution rather than as a source of input for future development. One private university intends to take the Job Profiles and review them with faculty and administrators to ensure consistency with both course content and overall macro program curriculums.

PROJECT RECOMMENDATIONS

Although the Skills Needs Assessment Project has officially concluded, there are a number of recommendations for consideration through which the value derived from the project may be further enhanced. These broad project recommendations and other general observations are summarized below.

Conduct survey(s) of Emerging Sector employers within the Aerospace, Film, & Health Care sector(s).

Aerospace: Approximately midway through the project, the County began considering the addition of the Aerospace industry to the Emerging Sector list and suggested that the industry be included in the SNAP project. Unfortunately, the vast and detailed information required for inclusion in the survey process was not readily available at the time of survey implementation. Consequently, insufficient data was collected and significant conclusions as to the jobs required within the sector could not be drawn. All indications are, however, that the sector will play a role in the growth of the Southeast Michigan region moving forward. It will be particularly important for the County to make a concerted effort to gather specific information from this sector as it is one that will require extremely technical and forward thinking employees.

Health Care: With the recent announcement of the “Medical Main Street” initiative, it would be in the best interest of the County to build upon this important endeavor by conducting a survey which specifically addresses the future needs of the health care industries, both with current and emerging employers. It is anticipated that the Biotechnology, Nanotechnology, and Medical Devices business sectors which fall under the Medical Main Street umbrella will account for significant job growth amongst both current and emerging employers as corroborated by national statistics. In addition, jobs not directly linked to emerging sectors but still within the healthcare realm such as ambulatory health care services, nursing and residential care facilities, and social assistance are still anticipated to experience positive growth. It will be important for the area workforce developers and educators to have the ability to meet this need by providing employers with well prepared candidates.

Film Industry: The State of Michigan and Oakland County have undertaken an aggressive film production attraction effort to lay the foundation for an industry that will support long-term job growth. The ability to attract Motown Motion Pictures, LLC, a film studio and a production services company, has resulted in the investment of approximately \$70 million in a 600,000-square-foot development in Pontiac. This project alone is expected to create over 5,000 new jobs, directly related to movie and film production. In order to continue this trend and attract additional investment to the region, it will be critical to identify the competencies required for the types of jobs associated with this industry. As the industry is relatively new to the region, communication of necessary skill sets and competencies to the education and training community will be critical if the County intends to ensure an avenue and career path for interested residents.

Conduct an in-depth survey of the Alternative Energy sector examining the diverse business sectors within to include Energy Storage, Wind, Solar, Hydro and Biofuel.

Although renewable energy was included in this study, recent acceleration in specific sectors (Energy Storage/Batteries, Wind, Solar, Hydro, and Biofuel) appear to be playing a significant role in the economic development and diversification of the region, and will require a new set of technical skills and competencies. The SNAP survey assessment tool could be valuable in the identification of the educational requirements necessary to be successful in this cutting edge field. Results garnered would further assist in the identification and development of education and training programs to adequately prepare the workforce within Oakland County for positions in the field.

Integrate the new one-of-a-kind Needs Assessment Tool within the Business Development Office of Oakland County and have the respective officers require that any company interested in working with the County first complete the assessment.

In order to continue the building of a database and create an inventory of emerging sector job profiles and associated skills/competencies, it is strongly recommended that the County implement a policy that would require any new company requesting assistance or input from the Business Development Office, to first complete the Needs Assessment Survey instrument. This will not only assist the Business Development Officers in their efforts to work with the respective company, but will provide the County with critical information that should be compiled into an extremely valuable and unique database for decision making.

Consider conducting a survey of the industries that are outside the Emerging Sectors designation, but contain occupations that are predicted for future growth.

Using available resources, it is recommended that the county workforce development department research and identify those specific occupations outside of the Emerging Sectors with a demonstrated growth rate. Specific industries (i.e. business and professional services) and/or employers containing these occupations can be targeted to receive the customized survey to develop Job Profiles.

The following are examples of growth industries, at the national level, that could be studied for Oakland County:

Government: It is predicted that in spite of budget and administration changes, there will be growth in government positions. Specifically, growth in specialized areas related to border transportation and security, emergency preparedness, public health, and information analysis.

Education: Nationally, this industry added a significant number of jobs during the first eight months of 2008. Factors that contributed to the industry's growth include: (1) The movement toward universal preschool and all-day kindergarten requires more preschool and kindergarten teachers; (2) Greater emphasis on classroom inclusion of disabled students necessitates more special education teachers; (3) Classrooms requiring more teacher assistants to meet the needs of special education and ESL students; and (4) Greater demand for postsecondary teachers due to more high school graduates attending college and professionals returning to school.

Business Services: This sector has a broad reach. It is comprised of several sectors, including engineering, computer systems, and consulting; all of which experienced growth from January to July of last year: (1) Architectural and engineering services added new jobs, with a greater need for biomedical, civil, environmental and industrial engineers. (2) Because of the continued and rapid developments in technology, computer systems design and related services added jobs. (3) Management and technical consulting is growing in part due to continuing complexity of business, and growing demand for advice in all areas of business planning.

Leisure & Hospitality: While the overall leisure and hospitality industry is experiencing a decline (no doubt from cutbacks on leisure activities), there were a couple of growing areas (e.g. food services, drinking establishments, performing arts, and spectator sports).

Schedule sessions with select representatives of the county to review the Needs Assessment Survey results and to discuss the capabilities of the survey tool moving forward.

It will be important for Business Development Officers and other appropriate personnel within the county to gain a comprehensive understanding of the key results and trends identified in the survey. Further, it will be equally important that the representatives are apprised of the capabilities of the Survey Tool moving forward. It is recommended that group sessions be scheduled to accomplish both goals.

Work with Oakland Schools (K-12).

Colleges and universities are currently teaching basic skills that the student should have mastered by the time s/he finished high school (.e.g., grammar, writing, comprehension, listening, etc.). It is believed that long-term, many of the soft-skill deficient areas could be enhanced, or added, to the K-12 school curriculum. Oakland Schools has already achieved success in Career-Focused educational programs. The acceleration of this effort would allow the two and four year colleges and universities to eliminate these basic-skills courses from their curriculum, and enable them to concentrate on more advanced and more technical courses.

Facilitate the offering of professional “coaching” targeted toward management level employees within the Emerging Sector companies.

There was considerable sentiment expressed regarding the need for on-site “coaching” for management staff in particular. The workforce attracted by Emerging Sector employers consists, in many cases, of younger employees that have a different approach to the job and careers than in the past. Future managers will face significant challenges and will require the flexible skill sets necessary to address key issues such as motivation, teambuilding, professional communication and leadership. It will be important for the County to work with the Stakeholders to determine if “coaching” resources are available at either the institutions or within workforce development. If so, make sure that companies are aware that they exist and how to use them. If not, consider the development of a coaching resource that would address the needs of both existing and developing companies.

Determine the current level of blended seminars or workshops available through the area colleges and universities. Develop those that are not available, including potential Certificate Programs.

One of the quickest and most effective ways that the educational institutions within Oakland County can respond to the immediate needs identified by the emerging sector employers is through the offering of one/two day seminars or workshops. These workshops/seminars could be delivered in either a “stand-up” or on-line format and would specifically address some of the key “soft skills” topics identified as needing immediate attention within the companies. Further, a series of seminars or workshops could lead to a unique formalized Certificate Program comprised of offerings from a partnership of organizations. Each institution would take ownership of a particular area to be addressed based upon its capabilities and areas of specialization. A feasibility study should be conducted to address possible providers, content, delivery method, cost and methods of payment. In an effort to ensure that all institutions would be represented equally and the process would be seamless and objective, it may be feasible to have an organization such as Automation Alley serve as the host site for delivery of the onsite courses.

Conduct a specific follow-up with Emerging Sector companies regarding Co-op and Internship programs.

A concerted effort was made to gather input and data regarding the current activity and future needs regarding co-op and/or internship programs. The results were less than hoped for and while some limited conclusions may be drawn; it is recommended that a separate survey be administered. This shorter and more targeted survey may be directed to a specific segment of companies within Oakland County to determine the current level of program availability and individual specifications. More importantly, such a survey will allow for an assessment of the potential for new programs moving forward.

Assess the current status regarding the growing need for an Engineer with a more blended capability.

It is recommended that a quick assessment be conducted of area colleges, universities, training companies and engineering associations to determine the current status as it pertains to the development of academic or training content that prepares engineers to be more diverse in their capabilities. This is in direct response to the comments regarding the need for engineers with a background in both electrical and mechanical engineering as stated in the Themes section above.

How Stakeholders can maximize the value and use of the Competency Profiles/Skills Checklists.

The profiles were developed and designed to meet the needs of three (3) stakeholder groups: the Workforce Development Office, Educators, and Emerging Sector Employers. The information below further defines how the Occupational Profiles can be used by these individual stakeholder groups.

Workforce Development Office:

- **Evaluate** current training programs to ensure they deliver the skills/competencies required by emerging sector companies
- **Develop** new training programs, if required
- **Advise & Counsel** displaced workers on career avenues
- **Re-Skill** displaced workers in jobs that are in demand
- **Market** Programs to employers and displaced workers

Business Development Office:

- **Attract** new emerging businesses to Oakland County by demonstrating an awareness of the job requirements, the associated skills and competencies, and thereby convincing potential emerging sector employers that the County has a skilled workforce to meet the needs of that sector.

Educational Community:

- **Evaluate** current courses/curriculum to ensure their programs deliver the skills/competencies required meet the needs of the emerging sector companies
- **Develop** new courses, programs, and curriculum, as required
- **Advise** Students on career avenues
- **Re-Skill** displaced workers in jobs that are in demand
- **Market** programs in demand by growth sectors

Emerging Sector Employers:

The Profiles created in the Skills Needs Assessment Checklist Project can serve as the nucleus of a Human Capital Development System (HCDS). The term Human Capital builds on the concept of human capital as an asset of an organization, implying recognition of the monetary worth of the competencies.

An organization is limited in its potential, unless there is a successful system in place to maximize human capital. Since the Profiles include critical competencies required for key positions, an employer could easily develop the HR systems necessary to provide a competitive advantage through the following:

- **Competencies** – A cluster of related knowledge, skills, abilities, and attributes that affect a major part of one’s job (role or responsibility), that correlates with performance on the job, that can be measured against well-accepted standards, and can be improved upon via training and development.
- **Employee Development** – What skills and competencies does an employee need to improve performance?
- **Training and Development** – What training course provides those skills/competencies?
- **Employee Selection** – Profiles can be used as Job Descriptions and as a checklist for the evaluation of job candidates.
- **Performance Management** – Required skills/competencies can be part of a performance review system.
- **Workforce Planning** – What skills/competencies would be lost through layoffs, retirements, or other attrition?
- **Succession Planning** – What skills/competencies does an employee need to be able to replace a more senior employee?

Develop a plan and process to periodically update profiles and maintain a current database.

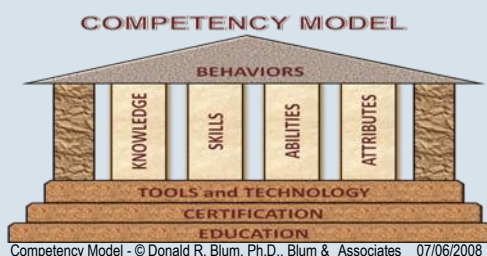
There were numerous recommendations made during the Collab and Interview phases of the project to develop a process to update and maintain the profiles and database. There was concern that this project would be an “event” instead of an “ongoing process,” and that the data collected would “sit on a shelf.” Economic conditions change, jobs change, technologies change. There is a wealth of information in the profiles that can provide a competitive advantage for the Workforce Development Office, Business Development Office, Educational Community, and Emerging Sector Employers. It is recommended that new emerging sectors be surveyed, as well as current sectors be periodically surveyed and the findings be updated in the database.

There is a strong need for “One Stop Shopping” when looking for resources to assist in workforce development.

It was not uncommon for managers interviewed at stakeholder companies to indicate that they were not aware of who to contact for workforce assistance within the county, but were anxious to do so. The county should study its current marketing of the workforce development area in conjunction with area education and training providers. The goal should be an internet site that can be marketed as a “one-stop shopping” site for everything “workforce development.” This would be extremely advantageous for employers and job seekers, and would serve as a starting point by providing both relevant information and appropriate links to available resources.

Consider the transition from Job Profiles to Competency Model.

It became apparent to the Project Team during the Research Phase that the concept of a Skills Needs Assessment Checklist was perhaps too narrow a focus to meet the specific needs of the various stakeholder groups and this was validated with Stakeholders in the design phase. As a result, the Job Profiles served as the final product that was developed and validated. Internally, however, from early on in the process, the team viewed the project as the ultimate development of a foundation that could serve as a “Competency Model” for all segments of the Stakeholder group. Moving forward, it is recommended that the results from this survey and any further use of the survey tool be considered as such.



A competency model describes the particular combination of knowledge, skills, abilities and attributes needed to effectively perform a role in an organization, and is used as a human resource tool for selection, training and development, performance management, and succession planning. The following is a graphical depiction of the model.

CONSULTANT INFORMATION

Project Partnership

EdEn Inc., located in Rochester, MI, is a full-service economic development consulting, project management, and educational services firm. David G. Banchiu is the founder and president of EdEn Inc and was the co project manager. Joining David on this project from EdEn Inc. were Kristina Arnone and Dawn Campbell. Kristina is an economic development, needs assessment and grant writing specialist. Her primary roles were research, design, and evaluation. Dawn Campbell is a Senior Project Manager and acted as project coordinator and was instrumental in the management of stakeholder and participant communication.

Blum & Associates, LLC, located in Troy, MI, provides Human Resources and Organizational Development consulting, specifically designed to meet the needs of both small and medium-sized organizations. Donald R. Blum, Ph.D., CPT, is the President and Principal Consultant of Blum & Associates, LLC, and was the co-project manager on this project. Don brings over 17 years of management experience within HR and OD at the corporate, division, and operations level of global manufacturing companies.

Consulting Services

The survey tool was developed and hosted by **4Word Systems, Inc.** in Brighton, MI. Steve Szettella, President, and his staff programmed the survey tool, collected respondent data, and developed basic reporting features.

Survey results were analyzed by **Ty Partridge, Ph.D.**, of Royal Oak, Michigan. Dr. Partridge is an Associate Professor of Psychology (Cognitive, Developmental, and Social Psychology; Behavioral Cognitive Neuroscience), Department of Psychology, Wayne State University.

APPENDICES

APPENDIX A: RESEARCH PHASE DELIVERABLE

PHASE:	<i>Phase 1 – Research</i>
DELIVERABLE:	<i>Written report that identifies, by source, EdEn’s data and findings, and analyzes their relevance and application to the Skills Needs Assessment Checklist</i>
DATE:	<i>May 6, 2009</i>

The initial comprehensive research study for the Skills Needs Assessment Checklist project has been completed. Extensive employment, skills and assessment data, as available through various web-based information sources, has been reviewed and analyzed. Through a very labor-intensive process, the EdEn Project Team has determined which data is relevant and reliable and subsequently compiled this data in various forms allowing for further manipulation.

As part of the Research Phase, the project team has focused on the importance of aligning local, regional, state and federal initiatives in order to provide a comprehensive picture of the job market; however, identifying and analyzing industry parallels is only the first step in defining the jobs and skill sets to be targeted as part of this project.

Properly defined industry correlations, as further defined in the tables below, have provided the ability to drill down into high-growth, high-demand occupations (by job category and then job title) within each industry. Standardized occupational requirements and skill sets were then further analyzed to ultimately assist the project team in driving stakeholder consensus. This preliminary research data will be presented, in part, to the Emerging Sector employers selected for participation in the collaboratory session later this month.

The data collected in the Research Phase will continue to be enhanced throughout the project as we receive additional input from various key stakeholders. The first stakeholder group was convened for a



collaboratory session on April 30, 2008. At this time representatives from academia and workforce development provided valuable input pertaining to the perceived barriers between industry and education. Another collaboratory session will be held on May 16, 2008, at which time Emerging Sector employers will provide critical input on occupational data, checklist design and content. It is anticipated that Emerging Sector Employers will have additions to the preliminary list of occupations specific to their needs. As such, the occupations listed in the attached report are a springboard for future discussion and analysis and should not be considered an all inclusive list.

FEDERAL AND REGIONAL SECTOR ALIGNMENT

In order to align Oakland County's Emerging Sectors with available industry data, certain parallels must be made between the federally-based data sources and the locally defined sectors. The following table provides the correlation between the Career Voyages High Growth and Emerging Industries and the Oakland County Emerging Sectors.

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Advanced Manufacturing	Advanced Material & Chemicals Advanced Electronics & Control Systems Robotics & Automation Medical Devices & Instrumentation
Industry Description	
Advanced Manufacturing invents and creates the products people need and want. Whether it is clothing, cell phones, computers or automobiles, CDs and DVDs, food and drink, athletic gear, medicine or cosmetics, virtually everything we use on a daily basis is manufactured. These and many other products are part of everyday life because advanced manufacturing techniques make them reliable, affordable and available. Advanced manufacturing also plays a major role in creating solutions for a variety of problems. Hybrid cars that reduce pollution and conserve energy; implantable medical devices that improve health care; and special airtight packages to keep perishable foods fresh, are only a few examples of the challenges advanced manufacturers tackle. What makes manufacturing so versatile is technology. Advanced manufacturing applies cutting edge concepts in electronics, computers, software and automation to improve production. In the past 10 years, the use of computer systems and software to monitor and control processes in large and small plants has led to increased product quality and productivity. Communications technology has increased the ability of engineers and plant managers to check on operations-even if it's halfway around the world. Systems can be set up to transmit data on how much material is being used, how machines are running and if problems are occurring. The ultimate example of what can be achieved is "lights-out manufacturing," which allows a highly automated plant to be run by computers and robots, with minimal involvement by skilled human operators. These high-tech capabilities let engineers create more exciting products than were possible just a few years ago. One example of this can be seen in electronic devices like cell phones and digital recorders, which are getting smaller and less expensive, yet have more and more features built into them. This is possible because of the miniaturization of circuitry, and the use of "clean" assembly techniques that prevent contamination of sensitive components. Manufacturing encourages creativity and analytical thinking. It is an area where ideas can be tested almost immediately, and where one person's inspiration may lead to a major product breakthrough. For these reasons, students who want a career that is meaningful, exciting and rewarding, should consider advanced manufacturing. Whether a student's interest lies in production, engineering or designing, experts say there will be plenty of demand in coming years for qualified candidates-girls as well as boys. A recent study released by the National Association of Manufacturers and the Manufacturing Institute, reports that 81% of American manufacturers say their biggest problem is finding qualified workers. If this problem isn't fixed, the report states it will impact our nation's economic well-being.	

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Aerospace	Advanced Electronics & Control Systems Homeland Security
Industry Description	
Born in the early years of the last century, the U.S. aerospace industry is today the world's leader. From origins with the Wright brothers' 1903 flights at Kitty Hawk to the contemporary world of sophisticated jet, rocket, and missile technology - U.S. aerospace continues to be diverse, fast-paced, and cutting-edge. Today, hundreds of high technology American companies along with NASA (the National Aeronautics and Space Administration) and other federal agencies work collaboratively in the major sectors of aerospace including commercial air, space exploration, national defense, and research and development. U.S. aerospace employment currently totals over a million professionals working in good-paying jobs. With about a quarter of all current aerospace workers reaching retirement age in the next few years, there will be many new high wage career opportunities. To name a few: ▪ electronics and other scientists and engineers ▪ computer programmers and network systems specialists ▪ avionics and engineering technicians ▪ aircraft and spacecraft structural, surface, and systems assemblers ▪ engine and aircraft assemblers and mechanics In addition to these aerospace specific occupations, there will be demand for business managers, administrative support specialists, accountants, technical writers, and others.	

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Energy	Alternative Energy & Power Generation
Industry Description	
A large and growing part of the work force in the United States-and across the world, for that matter, is involved in keeping energy available day in and day out. These jobs involve things like finding oil and natural gas, extracting and delivering them to their end uses, whether it is heating a home with gas or refining crude oil into gasoline. They also involve finding and mining coal, operating the power plants and maintaining and repairing the power lines that deliver electricity to homes, schools and offices. Best of all, the demand for energy around the world is growing. And the number of jobs to keep the energy industry humming isn't just growing, it's booming.... Within a few years, engineers with four-year degrees may earn six-figures salaries. According to a recent survey by the Society of Petroleum Engineers, petroleum engineers with a Bachelor's degree and 11 to 15 years of experience can earn nearly \$90,000 a year. Those with 16 to 20 years of experience can earn more than \$109,000. Petroleum engineers with Master's degrees can earn about \$109,000 a year with 11 to 15 years of experience, and nearly \$116,000 with 16 to 20 years of work experience in their profession. The energy industry also needs civil, chemical, environmental, geological, mining, nuclear and seismic engineers. With big-name companies looking to hire the best graduates in these specialties, the pay-and job security can be very good. In fact, energy industry career prospects haven't been this good for 30 years. Because of a lull in interest in energy-related careers in the 1980s and '90s, the industry "is missing an entire generation of people," says Bill Young, director of enrollment management at the Colorado School of Mines. With large numbers of energy-industry professionals in their forties and fifties thinking about retirement, young people graduating with energy-related engineering degrees over the next few years "will have huge opportunities," Smith says. According to the U.S. Department of Labor's Bureau of Labor Statistics, a "roustabout"- that is, a laborer on an oil or natural gas rig- earns \$12.75 an hour, on average. A derrick operator can earn \$16.75 an hour and a rotary drill operator can earn	

almost \$18.70 an hour.

Good-paying jobs also exist at electric utilities. "It's not uncommon for someone with a two-year Associate's degree in energy technology to earn up to \$15 an hour in their first job and \$25 an hour within three or four years," says Barbara Hins-Turner, executive director of the Center of Excellence for Energy Technology at Centralia College, a community college in Centralia, WA.

You can get your foot in the door at oil and natural gas companies without a college degree. "Workers can enter the oil and [natural] gas extraction industry with a variety of educational backgrounds," the Bureau of Labor Statistics says. The most common entry-level field jobs usually require little or no previous training or experience. Other entry-level positions, such as engineering technician, usually require at least a two-year Associate's degree in engineering technology....

And the range of jobs is almost unlimited. Some electric utilities now are building their first new power plants in years. Coal-mining companies like Massey Energy say that one of their biggest problems is finding enough coal-mining equipment operators to keep up with the demand for coal. Oil and natural gas companies face a similar need for workers to keep up with demand and create the next generation of energy professionals.

Emerging renewable energy technologies, like wind turbines, also need more workers. In West Texas where the wind blows consistently, hundreds of turbines are being installed to generate power that is "clean," meaning power that is generated without releasing very many pollutants into the environment.

"There is tremendous potential for young people in renewable energy," says Herman Schellstede, president of Wind Energy Systems Technology of New Iberia, La. He is planning one of the first offshore wind "farms"-with 50 turbines each 300 feet tall-in the Gulf of Mexico near Texas.

"Energy is the powerhouse of the United States," he says. "And we will always need young people" to keep that powerhouse running.

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Financial Services	Financial Services
Industry Description	
Financial services jobs are available in diverse corporations and government agencies as well as in banks and other financial institutions. These types of positions provide opportunities to apply your skills with numbers in strategic financial planning, quantitative analysis, investment management and sales. Each of the various positions requires different skills and provides different rewards. Some of the job skills needed for a career in financial services include: ▪ Mathematical skills ▪ Analytical skills ▪ Computer skills ▪ Communication skills, such as writing and listening ▪ Leadership skills ▪ Problem-solving and decision-making skills ▪ Integrity ▪ Ability to work well with others, especially as a member of a team ▪ Organizational skills All corporations depend on accountants, auditors, and tax professionals to facilitate the flow of money, monitor the bottom line and protect the organization's assets and integrity. There are plenty of opportunities in non-financial services companies.	

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Homeland Security	Homeland Security
Industry Description	
Many of the activities and occupations that make-up the Homeland Security industry are not new, but until recently these sectors were decentralized and not considered part of one industry. The demands of the 21st century require more unified preparation and rapid, targeted responses. Homeland Security encompasses a broad range of activities and occupations including: ▪ Emergency preparedness and response ▪ Border and transportation security ▪ Infrastructure protection ▪ Information analysis ▪ Homeland defense Many homeland security jobs and career opportunities are with federal, state, and local government agencies, but there are also plenty of additional opportunities with private companies and nonprofit organizations.	

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Information Technology	Communications & Information Technology
Industry Description	
Information technology remains a critical aspect of work in all industries and sectors, as well as an industry in its own right. However, America continues to suffer from a shortage of qualified IT workers with flexible and portable skills who can readily adapt and respond to ever-changing IT demands and processes. If you do decide to specialize in technology, you should know that the industry can be viewed either by the types of jobs available or by the industries which are technology driven. Technology skills and computer proficiency are essential assets for workers in all industries. Even if the career you choose does not focus solely on IT, the job will most likely require the use of computers and technology to accomplish tasks and process information. 92% of all IT workers are in non-IT companies, 80% of which are in small companies (Information Technology Association of America). For all IT-related occupations, technical and professional certifications are growing more popular and increasingly important. IT workers must continually update and acquire new skills to remain qualified in this dynamic field. Completion of vocational training also is an asset. According to a May 2000 report by the Urban Institute, community colleges play a critical role in training new workers and in retraining both veteran workers and workers from other fields. People interested in becoming computer support specialists generally need only an Associate degree in a computer-related field, as well as significant hands-on experience with computers. They also must possess strong problem-solving and analytical skills as well as excellent communication skills because troubleshooting and helping others are such vital aspects of the job. And because there is constant interaction on the job with other computer personnel, customers, and employees, computer support specialists must be able to communicate effectively on paper, using e-mail, and in person. They also must possess strong writing skills when preparing manuals for employees and customers. From the basic entry level positions to Chief Information Officers, there are almost limitless possibilities in Information Technology.	

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Biotechnology	Biotechnology
Industry Description	
Life sciences, technology, manufacturing - it's all a part of biotechnology. With new discoveries being made every day, there are lots of opportunities to be a part of the action. To succeed and grow in the 21st century economy, biotechnology employers need to fill each position in their companies, from entry-level to the most advanced, with qualified, skilled individuals. Because the industry is experiencing such rapid growth, biotechnology firms often demand more skilled workers than are available and are projected to need more workers than are currently enrolled in training programs. There are two ways to learn more about the emerging biotechnology industry. There are the different stages of the biotechnology process: Research and Development (R&D) - conduct groundbreaking scientific research with state-of-the-art scientific technology. Biotech R&D Technicians take the first steps toward curing the world's deadliest diseases. They design state-of-the-art products and services to meet the needs of scientists in the worldwide biomedical research community. This dynamic career path offers opportunities in a variety of research fields. Quality Control and Assurance - perfect the systems and procedures of cutting-edge research and production. Making a biotechnology product involves meeting specifications for precision and safety. Quality Assurance requires the product to meet certain standards and specifications. These are the people who ensure that products are what the labels say they are. Manufacturing and Production - build innovative and life-saving scientific technology. Biomanufacturing is an essential component of today's biotech industry. A career in biomanufacturing requires creativity and innovative thinking. Biomanufacturing technicians are the experts on the development and maintenance of biotech machinery. They play an integral role in biotech research and are responsible for developing and maintaining the technology and innovative equipment that drives industry research. Alternatively, you might want to learn about specific sub sectors of biotechnology such as: Agriculture - conducting genetic research that may someday help fight world hunger, agricultural bio-processing is one of the newest and most exciting fields in the biotech industry. Experts agree that the future of farming in the 21st century will be shaped by agricultural bio-processing technology. Bioprocessing - helping save lives, making companies more profitable, and determining the future of medicine. Bioprocessing is an interdisciplinary specialty that draws on several scientific fields including: engineering, physics, chemistry, mathematics, biochemistry, biology, and, of course, biotechnology. Bioinformatics - working with sophisticated computer equipment, analyzing biological data, and creating massive genetic databases to unlock genetic secrets. The field of biology has progressively transitioned from a bench-based skill to a computer-based science. The bioinformatics sector represents the technological future of the biotech industry. Biotechnology is truly an opportunity to turn science fiction into science fact!	

Career Voyages High Growth and Emerging Industry	Oakland County's Emerging Sector
Nanotechnology	Micro/Nanotechnology
Industry Description	
Enter the world of the really, really small and the very, very precise. Nanotechnology is the group of emerging technologies in which matter is measured on the nanometer scale - down to individual atoms in size - and manipulated to produce unique materials and products. In the nano world, the width of a human hair is huge - about 80,000 nanometers! Now imagine working with parts just a few nanometers in size, visible only with the most powerful of electron, atomic, or scanning tunneling microscopes. Today, much of the work in nanotechnology involves basic research and development (R&D) sponsored and supported by	

corporate, university, and federal collaborations. Nanotechnology is just beginning to also have practical, commercial applications in such diverse fields as health care, information technology, manufacturing, and national defense.

Although nanotechnology deals with the very small, its anticipated impact on job growth and career opportunities in the United States is expected to be very large. Within the next 10 years, the National Science Foundation (NSF) estimates that the worldwide need for nanotechnology workers will rise from the current 20,000 to two million!

Work in the field of nanotechnology requires specialized education and training, but the job and career rewards for those who prepare themselves should be significant.

FACTORS AFFECTING EMPLOYMENT IN EMERGING SECTORS

Often times there are specific factors that underlie the projections of industry employment. Below are a few examples of factors affecting output and employment as they relate to the Emerging Sectors industries. This information can be used to better understand the projected changes in industry employment and output. Factors affecting individual occupations can be found on the occupation information pages.

2002 NAICS code	Industry Title	Factors Affecting Output and Employment
5412	Accounting, tax preparation, bookkeeping, and payroll services	Output is purchased by individuals and by a variety of industries and is projected to increase as the rest of the economy grows. Productivity is projected to grow slowly, resulting in employment growth.
3391	Medical equipment and supplies manufacturing	Output is consumed as a capital purchase or as an intermediate input by hospitals and other health care services. Output is projected to continue to grow faster than GDP, although the rate of growth is expected to be slightly less than that in the preceding decade because of some overseas outsourcing of production and of research and development. Employment is projected to continue to grow slowly, partly because of the expected effect of outsourcing on employment.
2211	Electric power generation, transmission and distribution	Output is consumed by individuals and is used as an input in virtually all industries. Output in this industry is expected to grow more slowly than GDP. The demand for electronic appliances is expected to grow, but will be offset by gains in energy efficiency in these appliances. Employment is projected to fall slightly as a result of continued productivity growth.
3251	Basic chemical manufacturing	Output is used as an input in the chemical, plastics, and petroleum-refining industries. Output is expected to fall slightly as a result of increasing imports. Employment is projected to decline because of decreasing production and increasing productivity. This industry is projected to be one of the 10 most rapidly declining industries, in terms of wage and salary employment, over the 2004–14 projection period.
3252	Resin, synthetic rubber, and Artificial synthetic fibers and filaments manufacturing	Output is used as an input in a variety of other manufacturing industries, including plastics and textiles. Output is expected to grow more slowly than GDP. Employment is projected to continue to fall as productivity growth improves.
3254	Pharmaceutical and medicine manufacturing	Output is consumed by individuals and is used in the health care industries. Output is projected to grow at a rate close to that of GDP as the aging population contributes to increased demand. Employment is projected to increase because of relatively strong demand.
3255	Paint, coating, and adhesive manufacturing	Output is used in the manufacturing and construction industries and is expected to grow at one-third the rate of GDP. Improved productivity is expected to cause a decline in employment.
3259	Other chemical product and preparation manufacturing	Output is used as an input in the manufacturing and construction industries and is projected to continue to grow more slowly than GDP. Employment is projected to fall because of continued improvements in productivity
3261	Plastics product manufacturing	Output is used as an input in many industries. Demand is expected to grow as manufacturers continue to substitute plastic products for products made out of other materials. Employment is projected to fall slightly as computer-controlled automation and other technological improvements contribute to strong productivity growth.

3312	Steel product manufacturing from purchased steel	Output is used in manufacturing industries. Output is projected to grow; employment is projected to fall because of improved productivity.
3313	Alumina and aluminum production and processing	Output is used in metal cans and shipping containers, fabricated structural metal products, and semiconductors and electronic components, as well as in other manufacturing industries. Output is projected to fall slightly because of increased imports. Employment also is projected to decline, as a result of decreasing output and increasing productivity.
3328	Coating, engraving, heat treating, and allied activities	Output is used in a variety of manufacturing industries, including electronic components, motor vehicle parts, and communications equipment. Output is projected to increase at approximately the same rate as GDP. Employment is projected to increase only slightly, because of continued productivity growth.
3329	Other fabricated metal product manufacturing	Output is used in the construction industry and is consumed by both individuals and businesses. Output is expected to grow at roughly one-third the rate of GDP. Employment is projected to decline slightly because of productivity gains.
3332	Industrial machinery manufacturing	Output is used as investment in the food, printing and publishing, paper, and other manufacturing industries. Many of these industries, including paper and textiles manufacturing, are expected to face increased international competition, resulting in downward pressure on demand. Other industries, such as petroleum refining and food processing, will increase their demand. The net result is slow growth in output. Employment is projected to fall because of relatively strong productivity growth.
3333	Commercial and service industry machinery manufacturing	Output from this industry is purchased for investment and personal consumption purposes. An increasing amount of imports is expected to put pressure on the industry, resulting in a decrease in output. Employment also is projected to fall, because of the shrinking output as well as increasing productivity.
3339	Other general purpose machinery manufacturing	Output is purchased as an investment by utilities and the chemical, construction, steel, and mining industries and is used as an intermediate input in heavy manufacturing sectors. Output is projected to grow more slowly than GDP. Productivity growth is projected to continue, so employment is expected to continue to fall.
3341	Computer and peripheral equipment manufacturing	Output is purchased as a capital investment by many industries, including retail trade, finance and insurance, and many other service industries. Output is projected to continue growing rapidly, primarily because of extremely large productivity gains, which are typical of this industry. Because of the large productivity gains, employment is projected to decrease, although not as rapidly as it did in the preceding decade.
3342	Communications equipment manufacturing	Output is purchased primarily as investment in the air transportation, broadcasting, and communications industries. Output also is used as an input to the aircraft missiles, space vehicles, construction, and communications industries. Output is projected to grow approximately 4 times as fast as GDP, with much of the increase due to productivity improvements. Employment is projected to fall slightly, at a rate much slower than in the preceding decade.
3344	Semiconductor and other electronic component manufacturing	Output is used as an input in the communications and computer equipment industries and also is exported. Output is projected to increase faster than GDP, with much of the increase due to rapidly rising exports. Productivity growth is expected to continue, resulting in a decline in employment.
3345	Navigational, measuring, electromedical, and control instruments manufacturing	Output is used mostly by the defense, aerospace, ship, and transportation industries. Output is expected to grow at approximately the same rate as GDP because of an increase in the number of satellites and global positioning systems used in navigational systems. Productivity is projected to continue to grow, so employment is expected to increase only slightly.
3346	Manufacturing and reproducing magnetic and optical media	Output is used in the construction, motor vehicles, lighting and wiring equipment, computers, and communications industries. Output is projected to grow at the same rate as GDP. Productivity growth is projected to continue, resulting in no change in the level of employment.
3361	Motor vehicle manufacturing	Output is purchased by consumers and as investment. Output is projected to grow more slowly than GDP, because large incentives in the form of low interest rates and significant rebates will not be as prevalent in the coming decade. Productivity is expected to increase, although not as fast as it did in the preceding decade. Employment is projected to grow only slightly.
3362	Motor vehicle body and trailer manufacturing	Output is purchased by the motor vehicle manufacturing industry, various intermediate industries, and consumers. Output in this industry is projected to grow faster than GDP. Slower growth in motor vehicle manufacturing will affect

		the industry; however, a growing market for commercial semitrailers will offset some of the deceleration. An increase in consumer equipment also is expected to affect the industry. Productivity growth is expected to continue because of automation and advanced manufacturing methods. Because of improvements in productivity, employment is not projected to increase as fast as output.
3363	Motor vehicle parts manufacturing	Output is used in the motor vehicle manufacturing industry and in various intermediate industries. Consumers also purchase parts for their vehicles. Output is projected to grow at approximately the same rate as GDP. Employment is projected to rise only slightly as productivity continues to grow because of improved technology.
3364	Aerospace product and parts manufacturing	Output is purchased by the defense industry, is exported, and is used in the production of aircraft and missiles. Output is projected to grow faster than GDP because of increasing defense aerospace production and an improving trend in the demand for civilian aircraft. Productivity should continue to improve, causing employment to increase modestly.
3369	Other transportation equipment manufacturing	Output is consumed by individuals and by the military. Output is projected to increase as the demand for motorcycles, bicycles, golf carts, and other recreational vehicles rises. Productivity is projected to improve slowly, and employment is expected to increase.
3391	Medical equipment and supplies manufacturing	Output is consumed as a capital purchase or as an intermediate input by hospitals and other health care services. Output is projected to continue to grow faster than GDP, although the rate of growth is expected to be slightly less than that in the preceding decade because of some overseas outsourcing of production and of research and development. Employment is projected to continue to grow slowly, partly because of the expected effect of outsourcing on employment.
3399	Other miscellaneous manufacturing	Output is consumed as an input in a variety of industries, such as apparel and retail trade. Output is projected to grow at its historical rate, about two-thirds the growth rate of GDP. Employment is projected to fall, because productivity is expected to grow faster than output.
517	Telecommunications output is consumed by individuals, government, business, and other institutions.	Output is projected to grow slightly faster than GDP. Revenue gains will come from new services such as video on demand and other, yet more sophisticated, services. The future of the industry is in wireless, cable, and satellite telecommunications. New products, such as WiMax wireless, 4G wireless, and VoIP calling, will encourage businesses to rethink their structure and favor wireless, cable, and satellite companies. Productivity is projected to grow more quickly than output, resulting in a small decline in employment.
516, 518, 519	Internet and other information services	Most output is used as an intermediate input by many other industries; some output is consumed by individuals. Output is projected to grow much faster than GDP, with the Internet expanding and branching out as the amount of information generated continues to increase. Productivity is projected to continue to grow at a rapid pace as well, however, not expected as fast as output. Employment is projected to continue to grow, but at a slower rate than during the previous decade.
521,522	Monetary authorities, credit intermediation, and related activities	Output is consumed by individuals and by firms and is projected to grow slightly faster than GDP. This industry includes depository credit intermediation establishments, such as banks and credit unions, and nondepository credit intermediation establishments, such as credit card and financing companies. Demand for services provided by nondepository institutions is expected to grow faster than demand in depository institutions. In the overall industry, productivity is projected to grow slightly more slowly than output, resulting in a small increase in employment.
523	Securities, commodity contracts, and other financial investments and related activities	Output is consumed by individuals and by financial firms. Output is projected to grow much faster than GDP. Population growth and increased saving by baby boomers will increase demand. Fairly rapid gains in productivity are expected because of further consolidation, improved technology, and automation. Productivity growth, however, is expected to be slower than output growth. As a result, employment is projected to increase.
5241	Insurance carriers output is purchased by individuals and a variety of intermediate industries.	Output is projected to increase as a growing population demands more insurance of all kinds, particularly health insurance. Productivity is expected to increase at a slower rate than output, and employment is projected to increase as a consequence.
5242	Agencies, brokerages, and	Output is purchased mostly by the insurance carrier industry. Output is projected

	other insurance related activities	to grow, with a continuing trend of brokers and agencies taking away business from insurance carriers. Employment also is projected to continue to grow as productivity growth decelerates.
525	Funds, trusts, and other financial vehicles	Output is purchased mostly by individuals and is projected to increase more slowly than GDP. Productivity is projected to grow slowly, resulting in some growth in employment.
5412	Accounting, tax preparation, bookkeeping, and payroll services	Output is purchased by individuals and by a variety of industries and is projected to increase as the rest of the economy grows. Productivity is projected to grow slowly, resulting in employment growth.
5413	Architectural, engineering, and related services	Output is purchased as an investment and is used as an intermediate input to many industries. Output is projected to continue to increase, but not as rapidly as it did in the 1990s. Employment also is projected to grow at a slower rate than it did in the previous decade. Demand for commercial architectural services has been waning for the past few years; indications are that large-scale residential projects may be starting to cool now. The communications revolution in the 1990s generated a good deal of growth in designing systems and devices that have now become commodities.
5414	Specialized design services	Output is purchased by most industries and by individuals. Output and employment are projected to increase. Productivity also is projected to grow, but at a slower rate than output. New computer graphics software makes graphic design and layout easier to perform. Certain industrial products increasingly will be designed overseas. Interior design will not be susceptible to overseas outsourcing, but that component makes up only a small share of the industry.
5415	Computer systems design and related services	Output is used as an intermediate input and is purchased as an investment. Output is projected to continue to grow rapidly. Factors affecting this industry include the expansion of intranets, an increased need for remote access, and the growing importance of security. Productivity also is projected to increase rapidly, although not as fast as output. Employment is projected to continue to grow as well, but not as quickly as it did in the preceding decade. This industry is projected to be one of the 10 fastest growing industries, in terms of wage and salary employment, over the 2004–14 projection period.
5416	Management, scientific, and technical consulting services	Output is used as an intermediate input in many industries. Output is projected to continue to grow as more companies hire consultants for various projects. Areas such as planning and logistics, as well as compliance with environmental regulations, employee benefits, and compliance with workplace safety regulations, should continue to drive demand for these services. Some productivity growth is expected, although employment is projected to continue growing at a healthy rate. This industry is projected to be one of the 10 fastest growing industries, in terms of wage and salary employment, over the 2004–14 projection period.
5417	Scientific research and development services	Output is used as an intermediate good, is purchased by the Federal Government, and is consumed by individuals. Output is projected to continue to grow faster than GDP. Research and development (R&D) in the physical sciences and in engineering should grow faster as manufacturing industries—particularly pharmaceuticals—outsource their R&D. Because R&D in the social sciences and the humanities is less sensitive to business cycles and is not directly linked to new developments in technology and industrial output, this segment should grow at a slower pace than the physics and engineering segments of the industry. As a result of large gains in productivity, employment in the overall industry is projected to grow more slowly than the average for the total U.S. economy.
5419	Other professional, scientific, and technical services	Output is purchased primarily as an intermediate input and by individuals for personal consumption. Output is projected to grow slightly faster than GDP. Employment also is projected to grow, although not as quickly as output. Growth of the cat population, coupled with pet owners' greater willingness to spend money on advanced feline and other veterinary medical care, will drive demand. Photographic services will increase slowly as improvements in camera technology and reduced prices allow more consumers to take photographs for themselves and as more commercial photographers work as self-employed contractors.
55	Management of companies and enterprises	Output is used as an intermediate input and is exported. Output is projected to continue to grow faster than GDP. Productivity also is projected to continue growing rapidly, although not as quickly as output. Employment is expected to

		increase.
5613	Employment services	Output is purchased as an intermediate input in many industries. Output is projected to grow faster than GDP. Because productivity growth is relatively slow in this industry, employment also is projected to increase. Business reliance on temporary help services and employment placement agencies is expected to continue, because of these sources of employment tend to endure business cycles by expanding or diversifying the categories of workers they offer. This industry is projected to be one of the 10 fastest growing industries, in terms of wage and salary employment, over the 2004–14 projection period.
5614	Business support services	Many intermediate industries purchase business support services. Output is projected to continue to increase more rapidly than GDP. Productivity also is projected to grow rapidly, although not as fast as GDP. As a result, employment is expected to increase moderately.
5616	Investigation and security services	Output is used primarily as an intermediate input in various business services. Output is projected to grow more slowly than GDP. Because productivity is projected to fall, employment is projected to rise faster than output. Increased post-9/11 security awareness is still spurring growth in this industry. Private firms are taking over duties both investigative and protective, formerly performed by police. An increase in employment background checks and increasing demand for investigative services to solve Internetbased crimes such as identity theft, intellectual property theft, and harassment also have contributed to growth in this industry.
8113	Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	Output is used as an intermediate input in many industries and is projected to continue to grow faster than GDP. Productivity is expected to grow faster than average, but slower than output. Employment is projected to continue to grow modestly.

NOTE: The official Research Phase report submitted to Oakland County Workforce Development contained the preliminary Skills Needs Assessment Checklists for all occupations (74) initially identified for research purposes; however, due to the length of the initial research report, those checklists have been not been included in this document.

APPENDIX B: DESIGN PHASE DELIVERABLE

PHASE:	<i>Phase 2 – Design</i>
DELIVERABLE:	<i>An acceptable and preliminary Skills Needs Assessment Checklist</i>
DATE:	<i>June 13, 2008</i>

The design phase for the Skills Needs Assessment Checklist project has been completed based upon input supplied by a group of key **Stakeholders**. The data collection for this phase consisted of collaboratory sessions (to be referred to as collabs), phone interviews and face-to-face interviews.

The Design Phase consisted of the following **deliverables**:

- Design of Checklist Format
- Design of Skills Profile Model
- Design Enhancement of Checklist Format
- Design of “Draft” On-Line Survey Tool
- Design and Development of Change Control Document
- Design and Development of a Preventive and Contingent Action Plan

Minimal “content” information (job importance, priority of skills, pay ranges for internships/co-ops, etc.) was collected in the Design Phase. Emphasis was placed upon the collection of data for use in the development of Forum and Survey Questions intended for the Validation and Implementation Phases.

STAKEHOLDERS PARTICIPATION

Stakeholders included representatives from the Oakland County Workforce Development Division, the Oakland County Planning and Economic Development Services Division, the Oakland Education Advisory Group, employers in emerging sectors, employer associations, Oakland County Michigan Works! Service Centers, and educators from K-12 school districts, the intermediate school district, and post secondary education institutions.

The proposal indicated that input would be collected from approximately 20 key stakeholders selected from the above mentioned groups; using ten (10) for the collab and ten (10) for validation. It was subsequently decided that a larger sample size would increase the probability of design success while also minimizing the number of changes in subsequent phases. As a result, two (2) collabs and numerous additional interviews were conducted, resulting in input from 36 Key Stakeholders (80% increase over proposed number).

COLLABORATORY SESSIONS

The Preliminary Skills Needs Assessment Checklist design was created by utilizing a Collaboratory located at the Oakland University Business Incubator (OU INC). A “Collaboratory” (Collab) session is a high-tech, cost effective method of collaborative data collection, coupled with decision support technology. A collaboratory can be further defined as a “center without walls” in which users can “perform their research without regard to geographical location – interacting with colleagues, accessing instrumentation, sharing data and computational resources and accessing information in digital libraries.” The technology used to support the sharing of information is facilitated through the use of a Distributed Decision Support System (DDSS). The term DDSS refers to an interactive computerized system that gathers and presents data collected from a variety of sources. These systems can dramatically impact

process design, planning efficiency and access to resources through same-time anyplace or anytime-anyplace support tools.

Collaboratory Session 1

The first Collab was held on April 30, 2008, and consisted of representatives from both the Workforce Development and Education community (All levels were represented to include K-12 and secondary education).

The collab environment accommodates 16 contributors. Although confirmations for sixteen (16) participants were received, after a number of last minute cancellations and “no-shows,” eleven (11), or 70% attended. It is important to note that the non attendees were largely from the secondary education institutions which resulted in less than acceptable representation from that group. As a result, we scheduled in-person or phone interviews with three (3) colleges/universities that had not participated in the collabs. Coupled with additional interviews with emerging sector representatives, our response rate for the Workforce Development and Academic Stakeholders increased to 15, or 94% participation (to include an attendee that was not at the first session but attended the second).

Collaboratory Session 2

The second Collab held on May 16, 2008, consisted of representatives from emerging sector companies. Again, after a number of last minute cancellations, we had eleven (11) participants (plus one we counted in Collab #1). Consequently, we have conducted, or are in the process of conducting, five (5) additional face-to-face and phone interviews, to bring our response rate to 16, or 100%.

DESIGN OF CHECKLIST FORMAT

There were two process options for the design of the checklist: (1) Start with a clean sheet of paper and collect all the data included in a skills profile; or, (2) Develop a “draft” design and solicit input from the collab participants to modify the “draft” checklist.

The Research Phase utilized a variety of web-based information sources to collect and analyze extensive employment, skills and assessment data. To maximize the knowledge gained in the research phase, and be respectful of collab participants’ time, the decision was made to develop a sample skills profile (checklist) based upon research at the national level and solicit “local” stakeholder feedback for improvement.

Through a labor-intensive process, the project team determined which data was relevant and reliable. First, a “draft format” was created to display the “draft checklist” and then significant time was devoted to developing the initial design that was shared with participants in the collaboratory sessions.

Rather than submit raw data in a massive spreadsheet, this initial design was also the format utilized to display the data submitted in the Research Deliverable to the Workforce Development Division. Consequently, rather than conduct the Research Phase and Design Phase in a linear timeline, the two phases were actually conducted simultaneously.

Documentation of Feedback

Feedback gathered in the Design, Validation and Implementation Phases of this project will be critical in the development of an effective tool that will accomplish the following:

- Identify necessary skill requirements
- Assist in the comparison of the skill requirements against existing education and training programs.
- Assist in the creation of programs to fill the gaps

The research tool will ultimately lead to an increase in the number of workers with skills in high demand areas thereby facilitating the attraction of emerging sector companies to Oakland County.

Initial Feedback on User Friendliness

One of the requirements in the RFP was to collect feedback on both the “user-friendliness” of the system, as well as the “content.” Collection of feedback on both areas will be on-going during every phase of the project

In the design phase, effort was made to ascertain Stakeholders’ overall vision of a successful checklist. As part of that effort, collab questions were structured relating to *Functionality* and *User-Friendliness*.

Direct quotes from the feedback received in collabs and interviews are listed below:

- “List skills in 3 areas: technical, academic, workplace/soft skills.”
- “A quick, easy to fill out, list of various skills that companies can check off what they need (like a menu of skills) that they can pick and choose from.”
- “Internet for easy access and manipulation.”
- “A list of skills that an individual should possess to be successful in an employment situation. In the best scenario, the list should be prioritized as to the importance of the skills.”
- “Consistent for each sector, consistent for all users, each level of education could do what they are capable of and the student could use it to see the path they need to go on.”
- “Be able to sort by company/industry.”
- “Allow companies to have electronic feedback (like the comment section on Hotels.com).”
- “It needs to be kept up-to-date and available electronically.”
- “Should contain links to related information/sites.”
- “Make sure educators and students are familiar with it and use it to plan their programs and their class selection (perhaps for students as part of registration).”
- “Be able to crosswalk with existing curriculum to see where the matches are, to be able to add items to the curriculum where needed. From that to create the training plans needed for students to obtain skills and move their career forward to the next level post-secondary and work. I want to use the checklist to save time and funding by putting things in place that are not relevant and keeping things in place that are preparing the student incorrectly.”
- “The ability to look at skills that work in more than one sector (cross training?).”
- “Key word searches to connect occupations and skills.”
- “An easy to understand list for each emerging sector, which was kept up-to-date in an electronic format that was easy to access and use.”
- “Able to use the exact same list when sitting down with post-secondary and industry to have conversations regarding partnerships and work experiences for students.”
- “Easily accessible, that has all the categories that were discussed earlier. This database will have common language and will be easy to navigate. It will be updated on a regular basis and provide information for program development/revision.”

On-Going Research

During the Design Phase there were requests by stakeholders to add twenty-eight (28) additional occupations specific to Oakland County. Further research is required to identify essential skills for these occupations and to create new profiles to add to our occupational inventory. It is anticipated that additional recommendations will be submitted through the interviews, survey, on-line forum, etc., and therefore, the plan is to continue research throughout subsequent phases of the project.

DESIGN AND DEVELOPMENT OF CHANGE CONTROL DOCUMENT

To ensure all feedback is captured and monitored, a Change Control instrument was developed to record and track all suggestions with potential merit. The project team reviews and discusses all suggestions logged on the Change Control Document, and value-added enhancements are incorporated into a revised checklist.

To guarantee all feedback is considered, every reasonable suggestion is logged and assigned a sequential Change Control Number. Each corresponding action is noted, along with the date of the decision and any clarifying comments. To preserve consistency, the Change Control Document is updated, retained and managed by only one person, the project manager.

Through the Design Phase, sixty-one (61) suggestions have been logged into the Change Control Document and all were reviewed and discussed by the project team. Of the 61 suggestions:

- 31 items were adopted as is, or being added to the Forum for validation.
- 12 items were considered to be non-value added.
- 10 items were part of our original proposal.
- 6 items were Out-of-Scope, but could be developed as Future Project Enhancements.
- 2 items were comments/advice and did not require action.

A copy of the **Change Control Document** is included in this report as **Appendix A**. In addition, this document will be used to provide feedback to the Stakeholders who participated in the collabs and interviews.

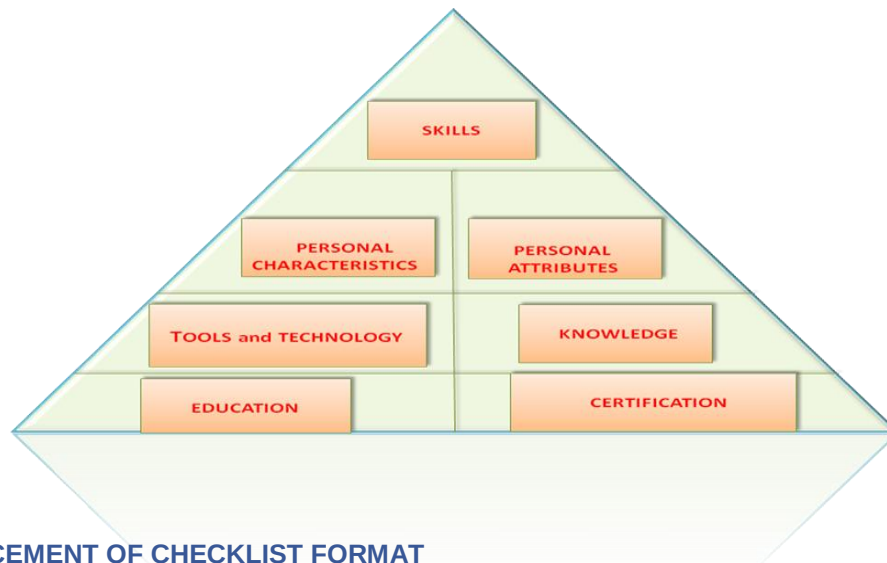
DESIGN AND DEVELOPMENT OF A PREVENTATIVE AND CONTINGENT ACTION PLAN

A proactive approach has taken to identify and assess the probability of potential problems and likely causes. Preventive Action and Contingency Plans have been developed, along with respective individual responsibility, to ensure maximum participation resulting in a high quality and value-added checklist.

This is a working document and will be updated to address current and anticipated issues as the project moves forward. A copy of the current Preventive and Contingent Action Plan is included as Appendix B.

DESIGN OF SKILLS PROFILE MODEL

The following model was created based on our research and collab feedback:



DESIGN ENHANCEMENT OF CHECKLIST FORMAT

A close resemblance exists between the “draft profile checklist” used to display the occupation data in the Research Phase and the “initial checklist” submitted in the Design Phase. Considerable up-front time and effort was put into creating the draft checklist format to display the Research Data to the Stakeholders and the format was, for the most part, acceptable to the stakeholders as drafted.

The sample profile below depicts various enhancements and the inclusion of collab/interview recommendations to our original design. These modifications were adopted through a Change Control Document process

OAKLAND COUNTY SKILLS NEEDS ASSESSMENT JOB PROFILE

OCCUPATION: COMPUTER SUPPORT SPECIALISTS

EMERGING SECTOR: ADVANCED MATERIALS AND CHEMICALS

OCCUPATION	COMPUTER SUPPORT SPECIALISTS
CODE	15-1041.00
INDUSTRY	Advanced Manufacturing
OCCUPATION DESCRIPTION	Provide technical assistance to computer system users. Answer questions or resolve computer problems for clients in person, via telephone or from remote location. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.
OTHER REPORTED JOB TITLES	Information Technology Specialist (IT Specialist), Electronic Data Processing Auditor (EDP Auditor), Help Desk Analyst, Computer Technician, Desktop Support Technician, Office Systems Coordinator
PROJECTED NATIONAL GROWTH (2006-2016)	Average
PROJECTED NATIONAL NEED (2006-2016)	242,000
TOOLS AND TECHNOLOGY	Tools used in this occupation: ▪ Floppy disks — MS-DOS-bootable disks ▪ Hard disk arrays — Redundant array of independent disks RAID systems ▪ Power meters ▪ Reflectometers ▪ Tape arrays — Digital tapes ▪ Technology used in this occupation: ▪ Backup or archival software — Backup and archival software; Disaster recovery software; Microsoft Volume Shadow Copy Service; Symantec LiveState ▪ Configuration management software — Automated installation software; Deployment software; Patch management software ▪ Desktop communications software — CrossTec NetOp Remote Control; Remote control software; Stac Software ReachOut; Symantec pcAnywhere ▪ Internet directory services software — Active directory software; Domain name system DNS software; Network directory services software ▪ Operating system software — Event log monitor software; Microsoft Windows Pre-installation Environment; Operating system monitoring software; Personal computer diagnostic software
KNOWLEDGE	Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming. Customer and Personal Service — Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction. Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services. English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar. Telecommunications — Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems. Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications. Administration and Management — Knowledge of business and management principles involved in

	strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources. Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods. Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models. Psychology — Knowledge of human behavior and performance; individual differences in ability, personality, and interests; learning and motivation; psychological research methods; and the assessment and treatment of behavioral and affective disorders.
Skills	Troubleshooting — Determining causes of operating errors and deciding what to do about it. Reading Comprehension — Understanding written sentences and paragraphs in work related documents. Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems. Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times. Writing — Communicating effectively in writing as appropriate for the needs of the audience. Speaking — Talking to others to convey information effectively. Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making. Learning Strategies — Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things. Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions. Instructing — Teaching others how to do something.
Abilities	Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events). Oral Expression — The ability to communicate information and ideas in speaking so others will understand. Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense. Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences. Written Comprehension — Ability to read and understand information and ideas presented in writing. Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem. Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, math operations). Near Vision — The ability to see details at close range (within a few feet of the observer). Speech Clarity — The ability to speak clearly so others can understand you. Speech Recognition — The ability to identify and understand the speech of another person.
Personal Attributes	Attention to Detail — Job requires being careful about detail and thorough in completing work tasks. Adaptability/Flexibility — Job requires being open to change (positive or negative) and to considerable variety in the workplace. Analytical Thinking — Job requires analyzing information and using logic to address work-related issues and problems. Dependability — Job requires being reliable, responsible, and dependable, and fulfilling obligations. Cooperation — Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude. Independence — Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.

	Integrity — Job requires being honest and ethical. Persistence — Job requires persistence in the face of obstacles. Concern for Others — Job requires being sensitive to others' needs and feelings and being understanding and helpful on the job. Initiative — Job requires a willingness to take on responsibilities and challenges.		
Educational Level	Associate degree		
Area of Concentration/ Major	Accounting and Computer Science Agricultural Business Technology Computer Hardware Technology/Technician Computer Software Technology/Technician Data Processing and Data Processing Technology/Technician Medical Office Computer Specialist/Assistant		
Certifications			
National Wages and Employment	Median wages (2006) \$19.94 hourly, \$41,470 annual Employment (2006) 552,000 employees Projected growth (2006-2016) Average (7% to 13%) Projected need (2006-2016) 242,000 additional employees		
MI Median Hourly Wage 2006		MI Median Annual Wage 2006	
\$19.76		\$41,100	
MI Employment 2004	MI Employment 2014	% Change	Job Openings
14200	16390	0.16	390

DESIGN OF “DRAFT” ON-LINE SURVEY TOOL

The above document was then redesigned for use as an On-Line Survey Tool for ultimate use in the Implementation Phase. The design of this preliminary draft survey data collection instrument will be validated in our next phase.

In an ongoing effort to provide Oakland County with more than specifically requested, it has been determined that the final report will provide not only the Skills needed for the five (5) key jobs in each sector, but also the following:

- **Criticality** – how critical is the skill
- **Difficulty** – how difficult is it to find job candidates who possess this skill
- **Frequency** – how frequently is the skill performed
- **Trainable** – can the skill be acquired through training

This additional information will provide the educational community with valuable knowledge to assist in assessing current curricula and prioritizing the development of courses and/or programs designed to fill skill gaps to meet current and future demands of emerging sector companies.

DRAFT SURVEY PROFILE

See attached survey profile document.

PARTICIPATION UPDATE

The EdEn project proposal promised solicitation of a statistically valid sample of the 600+ emerging sector companies located in Oakland County, as listed on the County's website. This will be achieved through utilization of assorted sample sizes relative to each respective project phase.

In the Design Phase input was collected from thirty-six (36) Key Stakeholders representing Workforce Development, Education, and Emerging Sector businesses. Achievement of statistical validity is on-track.

INTERNSHIP AND CO-OP PROGRAMS

Twenty-three (23) questions in Collab #1 and fourteen (14) questions in Collab #2 were related to Interns and Co-Ops. In addition, similar questions were included in the interviews conducted. Although considerable feedback was received, there seems to be a divergence in terminology and additional questions with more structure regarding this topic will be included in the On-Line Forum.

Collaboratory and Interview Statistics

Internship Programs

Responses by the Educational Community and Workforce Development

- 33% (4 schools) give credit for internships.
- 25% (3 schools) do not give credit for internships.
- Length of internship varies between 3 months and 1 year.
- 50% of interns are paid; 50% are not paid.
- Approximately 42% of interns get hired by the company they served their internship with.

Responses by Emerging Sector Employers

- 81% of the participating companies use interns (9)
- 73% have Summer Internship programs.

- 50% use College students
- 73% pay their interns.
- 11% of interns are hired by the company they interned with

Co-op Programs

While data collection on Co-Op Programs was not requested in the RFP the following information was obtained given the opportunity:

Responses by the Educational Community and Workforce Development

- 42% of schools have co-op programs (primarily high school).
- Most give academic credit
- 50% of those answering have co-op requirements.
- 33% of co-op students are offered permanent jobs.

Responses by Emerging Sector Employers

- 50% of the companies hire co-ops.
- 55% of the companies have programs geared towards post secondary students.
- 100% of those responding pay their co-ops.

MOVING FORWARD

The approach to the project will migrate from a "checklist" to a "profile."

The Forum will be established to ascertain more than just validation for the "profile". It will also be utilized to gain input and insight regarding the possible operational gaps that exist between the workforce development, education and employer representatives.

The Forum will also be utilized to gain further input on the Co-op/ Internship opportunities.

APPENDIX C: VALIDATION PHASE DELIVERABLE

VALIDATION DELIVERABLE: SUBPHASE I

PHASE:	<i>Sub Phase I: Validation</i>
DELIVERABLE:	<i>Review and Enhancement Suggestions and Recommendations Refined and Enhanced Checklist</i>
DATE:	<i>August 21, 2008</i>

Sub Phase 1 of the Validation Phase for the Skills Needs Assessment Checklist project has been completed based upon input supplied by Stakeholders. The data collection for this phase consisted primarily of phone interviews, face-to-face interviews, and the web-based forum.

Sub Phase 1 of the Validation Phase accomplishments consisted of the following elements:

- Checklist / Profile
- Addition of 11th Sector - Aerospace
- Stakeholder Recommendations and Change Control Document
- Enhanced Checklist
- Interviews
- On-Line Forum
- Increased Concentration on Top Jobs
- Design of Pilot Survey Instrument
- Preparation for Sub Phase 2 – Pilot Phase
- Preparation for Implementation Phase

WORK PROCESS

Due to the relatively short timeframe in which to complete this project, our team has worked on several phases simultaneously; e.g. we designed the initial “draft” of the checklist while in the Research Phase and began validation interviews while still in the Design Phase. We are currently working on elements for both the Pilot and Implementation Phases. The advantage of this work process is we have been able to meet the project timeline. The disadvantage is there is a blurring of clean distinct lines of demarcation between phases.

CHECKLIST / PROFILE

The “draft version” of the Skills Needs Assessment Checklist presented during the collabs had an initial acceptance by representatives from the Oakland County Workforce Development Division, the Oakland County Planning and Economic Development Services Division, the Oakland Education Advisory Group, employers in emerging sectors, employer associations, Oakland County Michigan Works! Service Centers, and educators from K-12 school districts, the intermediate school district, and post secondary education institutions

ADDITION OF 11TH SECTOR - AEROSPACE

It was recently agreed that Aerospace would be added as an emerging sector. This 11th sector is beyond the initial scope of the project. As a result, additional research on the national level was undertaken to identify top jobs, based on demand, and profiles were created for these positions.

STAKEHOLDER RECOMMENDATIONS AND CHANGE CONTROL DOCUMENT

Participants in the collabs as well as interviewees offered numerous suggestions. To ensure all feedback from the preceding interventions was captured and monitored, a Change Control instrument was developed to record and track all suggestions with potential merit.

Every reasonable suggestion is logged and assigned a sequential Change Control Number. The project team reviews and discusses the merit of all suggestions logged in the Change Control Document, notes corresponding action along with the date of the decision and any clarifying comments, and value-added enhancements are incorporated into a “revised” checklist. To preserve consistency, the Change Control Document is updated, retained and managed only by the project manager.

Through Validation – Sub Phase 1, seventy-one (71) suggestions have been logged into the Change Control Document and reviewed by the project team. Of these suggestions:

- 33 items were adopted as is, or were added to the Forum for further validation
- 17 items were considered to be non-value added
- 10 items were part of our original proposal
- 9 items were Out-of-Scope, but could be developed as Future Project Enhancements
- 2 items were comments/advice and did not require action.

Thirty-three of the suggestions (46.5%) were adopted and incorporated into the project. To facilitate open communication and address an issue regarding project feedback raised in the collab, the Change Control Document was sent to all Key Stakeholders participating in the collabs and interviews, to help promote a “Common Language” among the different groups.

A sample of suggestions incorporated into the checklist design is listed below. A complete listing can be seen in the Change Control Document, Attachment A.

CHANGE CONTROL DOCUMENT SUGGESTIONS

- Change the heading on the profile Personal Characteristics to Personal Attributes
- Change the heading on the profile from Education Level to Educational Level
- Change the heading on the profile from Concentration to Area of Concentration/Major
- Adv. Mfg. Sector: Add Process Engineer occupation
- Robotics & Automation Sector: Add Project Manager
- Robotics & Automation Sector: Add Systems Engineer
- Medical Devices: Add Sales
- Medical Devices: Add Clinical Managers
- Distinguish between “Required” and “Desired” in all areas on the Profile
- Add Bilingual requirement to the Checklist/Profile

ENHANCED CHECKLIST

The attached Profile, shown in Attachment B, includes various enhancements based on suggestions derived from collab and interview feedback. Minimal observable modifications have been made to the appearance of the checklist itself, yet several improvements were made to descriptive terminology, resulting in the development of a “common language” acceptable to all stakeholder groups.

INTERVIEWS

Fourteen (14) interviews were conducted subsequent to the collab sessions. The interviews served multiple purposes: (1) Continue to collect information on various topics, e.g. Internships and Co-Ops; (2)

“Validate” the preliminary checklist design created during the Research Phase; and, (3) Solicit feedback on the preliminary draft survey instrument design and data collection topics.

Interviews consisted of representatives from educational institutions, emerging sector companies, an employer association and the president of the local chapter of an international training and development association. Specifically, interviews were conducted with the following entities:

COMPANY	SECTOR
<i>Lawrence Technological University</i>	<i>Education: Post Secondary</i>
<i>Oakland University (2)</i>	<i>Education: Post Secondary</i>
<i>Eprize</i>	<i>Communications and IT</i>
<i>ESYS</i>	<i>Robotics and Automation</i>
<i>Fanuc</i>	<i>Robotics and Automation</i>
<i>Jervis Webb</i>	<i>Robotics and Automation</i>
<i>Somanetics</i>	<i>Medical Devices</i>
<i>Society of Automotive Engineers</i>	<i>Employer Association</i>
<i>American Society for Training</i>	<i>Training and Development Assoc</i>
<i>DonorDialogue</i>	<i>Communications and IT</i>
<i>Country Day</i>	<i>Education: K-12</i>
<i>Walsh College (2)</i>	<i>Education: Post Secondary</i>

In addition, approximately nine (9) incremental in-person or phone interviews (six emerging sector companies, one K-12 educational institution, one employer association, and one key stakeholder) will be conducted during the remainder of the Validation Phase to supplement the Forum.

ON-LINE FORUM

A pro-active approach was taken to increase stakeholder participation and strengthen the statistical validity of the Validation Phase.

The number of validation participants was increased from the original proposal number of 60 entities to 125 entities (208% of original planned number), including invitations to fourteen (14) members of the Workforce Development Board of Directors.

On-Line Forum Participation

The forum was officially launched on July 25, 2008, with each of the 125 stakeholders receiving an email invitation and request to participate. A follow up email was sent on August 4th from John Almstadt, reminding stakeholders to participate. In addition, numerous personalized emails were sent to attempt to stimulate participation.

Despite our efforts, stakeholder participation on the On-Line Forum was less than we would have liked especially in the identification of Top Jobs. Only 14% of the registered users were “active users.” The site was accessed by an average of five (5) visitors per day and received an average of three (3) posted comments per day. Forty-one percent (41%) of the active users collectively posted a total of 84 posted comments on the Forum.

The project team interviewed a sample of registered stakeholders, researched generic on-line forum participation rates, and brainstormed potential reasons for the less than desirable participation rate. This informal investigative process identified the following results:

- Stakeholder feedback on the Checklist/Profile was extremely “positive” throughout the collabs and interviews. Therefore, stakeholders didn’t see the need to comment on the survey.
- Participants were waiting for someone else to post a comment first.
- Topics were not controversial enough to entice users to post their comments.
- The Forum was too complex for some as they opted to send direct emails with input.
- The Forum contained too many topics.
- The average stakeholder was not comfortable with a high-tech electronic data collection system.
- Lack of stakeholder time.
- Lack of interest in the project.

Action Plan

Having anticipated “lack of participation” in our Contingency Plan, the Project Team will take the following pro-active actions:

- Extend the On-Line Forum dates beyond the completion of the Validation Phase.
- Re-assess the Forum for complexity and user-friendliness.
- Launch an aggressive email “reminder” and “follow up” program.
- Place controversial comments on the Forum to inspire and entice users to react.

INCREASED CONCENTRATION ON TOP JOBS

It is anticipated that with the “email reminder and follow-up program” mentioned above, Forum participation will increase. In addition, to ensure the identification of “Top Jobs,” the project team has expanded the data collection methods beyond the use of the On-line Forum. The additional approaches include:

- The identification and ranking of Top Jobs will be incorporated into the Pilot Survey.
- Four (4) “new” companies from each sector (44 in total) will be identified and contacted via call-center personnel and will be asked to participate in a short phone survey to identify and rank Top Jobs in their organization.

These actions will ensure valid data for the Implementation Phase.

DESIGN OF PILOT SURVEY INSTRUMENT

Considerable time was spent drafting the design of a survey instrument that is user-friendly and collects the required information.

The basic Profile designed in the Research Phase and enhanced in this Sub Phase 1 of the Validation Phase, was the genesis for two iterations of the survey instrument. The PRELIMINARY SURVEY INSTRUMENT, shown in Attachment C, will undergo yet a 3rd iteration when modified for electronic use.

In an ongoing effort to provide Oakland County with more than specifically requested, it has been determined that the survey output will provide not only the SKILLS needed for the five (5) key jobs in each sector, but also the following five (5) elements: **CRITICALITY** of the Skill, **FREQUENCY** the skill is performed, and **DIFFICULTY** finding job candidates who possess the skill. For the skills most difficult to find in job candidates, another dimension will be introduced; that of **JOB EXPECTATIONS** - Whether the skill is “required” of the job candidate by the employer to obtain the position, or whether it is “preferred but the employer is willing to train.” The employer’s preferred **TRAINING MODE** is then selected from the following choices: University, Community College, Vendor, Internal Corporate Training, or On-The-Job Training.

The classification and prioritization of skills using this framework will benefit Employers, Workforce Development Department, and Educators by providing them with a self-diagnostic tool to assess potential gaps between their “current” and “desired state.”

PREPARATION FOR SUB PHASE 2 – PILOT PHASE

Our proposal stated the pilot would consist of surveying two (2) companies per sector. To assure a high degree of validity in the pilot survey, eight (8) companies per sector (88 in total) will be targeted.

These eighty-eight (88) “new” emerging companies will provide a “fresh eyes” look at the Checklist/Profile, offer feedback on “top jobs,” supply information on interns and co-ops, comment on the design of the survey instrument and skill rating criteria to be used in the Implementation Phase, and have an opportunity to provide their opinions on a variety of other topics.

PREPARATION FOR IMPLEMENTATION PHASE

Several days were spent, and multiple websites utilized, to research and compile initial contact information for the 700 Emerging Companies identified on the Oakland County website.

To assure a high survey response rate for the 701 Oakland County Emerging Sector Companies during the Implementation Phase, the project team’s call center has already begun a refined phone solicitation campaign to identify by name, phone number and email address, the appropriate person within each company to participate in the survey process.

To date, we have made over 400 calls and spent over 39 actual hours on calling/data entry/follow-up, resulting in 127 confirmed contacts and 20 refusals to participate.

ATTACHMENT A

Change Control Document (Final Change Control Document can be found in Appendix E).

ATTACHMENT B

Checklist/Profile (Final Job Profiles can be found in the Survey Results section of this report).

ATTACHMENT C

Preliminary Survey Instrument (first section of preliminary document is displayed on the following page).

Oakland County Skills Needs Assessment Job Profile SAMPLE SURVEY

Occupation: Computer Support Specialists

Emerging Sector: Advanced Materials and Chemicals

Occupation	Computer Support Specialists	Projected National Growth (2006-2016)	Average
Code	15-1041.00	Projected National Need (2006-2016)	242,000
Industry	Advanced Manufacturing		
Occupation Description	Provide technical assistance to computer system users. Answer questions or resolve computer problems for clients in person, via telephone or from remote location. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.		
Other Reported Job Titles	Information Technology Specialist (IT Specialist), Electronic Data Processing Auditor (EDP Auditor), Help Desk Analyst, Computer Technician, Desktop Support Technician, Office Systems Coordinator		

		Skills Scoring System Instructions for Use					
		Rank 1 thru 5 Rankings should be applied with "5" indicating the greatest value and "1" meaning the least			N/A Place an "x" if this skill is not applicable to the position.	Trainability Indicate whether you believe this position is trainable.	Training Mode If you answer "Y" to trainability, please indicate the preferred method of training.
		Criticality How important is this skill to the position?	Difficulty How hard is it to find this skill the position?	Frequency How often do you need this skill?			
Tools and Technology	Tools used in this occupation:						
	Floppy disks — MS-DOS-bootable disks	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5		"Y" = Yes "N" = No "U" = Unsure	"F" = Formal "J" = On the job "I" = Internal "O" = Outsource
	Hard disk arrays — Redundant array of independent disks RAID systems	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Power meters	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Reflectometers	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Tape arrays — Digital tapes	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Technology used in this occupation:						
	Backup or archival software — Backup and archival software; Disaster recovery software; Microsoft Volume Shadow Copy Service; Symantec LiveState	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Configuration management software — Automated installation software; Deployment software; Patch management software	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Desktop communications software — CrossTec NetOp Remote Control; Remote control software; Stac Software ReachOut; Symantec pcAnywhere	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Internet directory services software — Active directory software; Domain name system DNS software; Network directory services software	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
	Operating system software — Event log monitor software; Microsoft Windows Pre-installation Environment; Operating system monitoring software; Personal computer diagnostic software	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5			
Section Comments	Comments Previous Section						

VALIDATION DELIVERABLE: SUBPHASE 2

PHASE:	<i>Sub Phase 2: Validation</i>
DELIVERABLE:	<i>Review and Enhancement Suggestions and Recommendations Refined and Enhanced Checklist/Survey Tool</i>
DATE:	<i>October 20, 2008</i>

Sub Phase 2 of the Validation Phase for the Skills Needs Assessment Checklist project has been completed. The Validation-Sub Phase 2 accomplishments consisted of the following elements:

- Interview
- Identification of “Top Jobs”
- Pilot Survey
- Stakeholder Recommendations and Change Control Document
- Enhancements to Survey Instrument
- Preparation for Implementation Phase

INTERVIEWS

In-person and phone interviews were conducted during both the Design and Validation Phase. The last formal in-person interview was completed during Sub Phase 2 of the Validation Phase. The last interview was with Mr. Bert Okma, Principal, International Academy (K-12). This was a rewarding interview, in that we received the recommendation to add a multicultural question to the survey.

“TOP JOBS” PHONE INTERVIEWS

The On-Line Forum didn’t yield the volume of responses we anticipated. As a result, the Project Team decided to identify twenty (20) emerging sector companies (2 from each sector) and conduct personal phone interviews with each company, to identify the “Top Jobs” within each sector.

Based on the phone data collected, our Project Team added four (4) new jobs not appearing in the national data, and re-mapped twelve (12) existing jobs to additional sectors.

The following four (4) jobs were added to our database:

- Project Manager
- Materials Scientist
- Industrial Engineering Technician
- Web Developer

PILOT

A pilot survey was conducted using a set of twenty (20) emerging sector companies (2 from each sector), that had not been used in any of the previous phases (Research, Design, or Validation-Sub Phase 1).

The purpose of the pilot was to collect data regarding:

- Issues with the survey content
- Issues with the survey format
- User friendliness
- Length of time to complete the survey

- Average number of jobs selected per participant
- Participant comments

Fourteen (14) comments and recommendations were received during the pilot.

STAKEHOLDER RECOMMENDATIONS AND CHANGE CONTROL DOCUMENT

Through the phases completed, 87 stakeholders and participants have been included in the data collection process.

During the entire project, stakeholder and participant suggestions and recommendations were recorded and monitored in a Change Control Document. In Sub Phase 2 of Validation, there were fifteen (15) recommendations, bringing the total recommendations to eighty-six (86).

One recommendation received from an interview was to add a multicultural question to the survey. The Project Team gave this recommendation considerable deliberation, because we were determined not to lengthen the survey. However, given the large number of foreign companies located within Oakland County and those conducting business in a global market, we decided to create and add four (4) intercultural abilities to be rated in terms of Criticality, Frequency, and Difficult to Find.

The other fourteen (14) suggestions were feedback received during the “pilot” survey. All fourteen of these suggestions were incorporated into the survey, resulting in increased user-friendliness.

ENHANCEMENTS TO SURVEY INSTRUMENT

Based on the feedback from the “Top Jobs” calls, Interview, and Pilot, the fifteen (15) suggestions received were incorporated into the content and design of the survey instrument. In addition, our Project Team had independently identified numerous improvements that were also incorporated.

Survey Content

A change to the survey content was the addition of four intercultural abilities:

<i>Intercultural Awareness</i>	The ability to recognize the value of diversity, knowing how your culture is viewed by others, and an honest assessment of one's biases and stereotypes.
<i>Intercultural Sensitivity</i>	The ability to understand and appreciate the potential and actual cultural factors that affect interactions within a relationship.
<i>Intercultural Intelligence</i>	The ability to switch ethnic and/or national contexts and quickly learn new patterns of social interaction with appropriate responses.
<i>Intercultural Competence</i>	The ability to work effectively with individuals or teams from different cultural and ethnic backgrounds, or in settings where several cultures coexist

Survey Design

As a result of feedback from multiple sources, the Survey Instrument was enhanced by making it more user-friendly. The current form of the Survey can be viewed by accessing www.skills-oaklandcounty.com and clicking on the “Take the Survey” tab. The generic User Name is ***oaklandcountysurvey***, and the Password is ***Oakland***.

PREPARATION FOR IMPLEMENTATION PHASE

The on-line survey was created in the Design Phase and enhanced in the Validation Phase. Surveys are a balancing act of data quality, respondent ease, time, and money. Web-based surveys are not inherently better than paper or telephone or vice-versa, it's just a matter of finding the best match to your respondents, and executing that method well.

SURVEY FACTS AND HOW WE ADDRESSED THEM

Survey Design

1. Keep surveys as Short as possible, with accurate time estimates and progress indicators. Response Rates are Highly Affected by the Length and Complexity of the Survey. When the effort is greater than their interest — respondents abandon the survey.

The length and complexity are unavoidable risks, but essential to collect the required data. In addition to a survey, this is an assessment that will provide a base-line for other initiatives. A progress bar indicates where you are in the survey process. The survey is long and complex. The survey is 8 pages in length, with a different topic on each page. There are multiple question formats and 5 different areas to rate within each question. A typical job survey may have up to 275 required responses, and takes approximately 20 minutes to complete. Each job selected on page #1, will generate a unique survey. Therefore, if a participant selected 3 jobs, they may have to complete up to 825 responses, which could take approximately 60 minutes to complete. Consequently, the maximum of 10-15% response rate could be reduced by as much as 6% - 10% dropout rate for each additional page of questions.

2. Create an easy password log-in (if any) to start the survey.

Each identified participant's email address was set-up as their User Name, and the Password for all respondents is "Oakland." This information was communicated in a personal email invitation.

3. Use conventional questions and scales, with minimal filler words.

A conventional format using a 5-point Likert Scale was used for this survey. Every effort was made to minimize the filler words.

4. The survey has to make sense – respondents must understand why you want their opinion, and trust that you'll actually do something with the answers.

Our team personally explained the importance of this project and how the data will be used, to each of the phone contacts.

5. Create an option to pause the survey and return later.

The survey saves input at the completion of each page. Therefore, a participant can stop, log-off, and come back at a later time, and the survey will take the individual back to where they left off, with no loss of information.

Survey Process

1. When there is no prior relationship with recipients, responses are typically in the 10% to 15% range.

No prior relationship existed between the Project Team and the emerging sector companies, and the County Business Development Department only had a relationship with about 40% of the emerging sector companies.

Realizing this as an issue, the Project Team felt it was necessary to take a number of proactive steps:

- A letter from L. Brooks Patterson announcing the project was sent to the 726 emerging Sector Companies, announcing the project and the upcoming survey.
- The Business Development Office supplied a list of approximately 300 contacts. The remaining 426 companies were taken from the Oakland County website and did not contain any contact information. An effort was made by the Project Team to investigate each of the 426 companies, using a variety of sources, to identify contact information.
- Between the combined efforts of our Call Center (manned by OCC) and our Project Team, over 2,000 phone calls were made, attempting to personally contact each of the 726 Emerging Sector Companies. The purpose was three-fold:
 - Establish a relationship with the company.
 - Explain the purpose of the project, its importance, and how the data would be used.
 - Identify the appropriate person within the company to receive the survey, and to collect the person's contact information (name, phone number, email address and title).

Within the 726 companies, we encountered 50 company Refusals to participate, 125 Wrong Numbers, and numerous Disconnected Phone Numbers, etc. To date, 409 personal contacts have been made with confirmations to participate in the survey. This cold-call process, was very labor intensive, and yielded a success rate of 20% (2000 calls to get 400 confirmed contacts). This process is on-going, as the Project Team is dedicated to achieving the highest number of contacts as possible.

In a meeting with Mr. Dennis Toffolo (Deputy County Executive), Mr. Stephen Huber (Marketing & Communications Supervisor), and Mr. John Almstadt (Workforce Development Manager), it was mentioned that we had encountered 50 companies that refused to participate. Mr. Toffolo offered to help and indicated he would: (1) send a letter, over his signature, to the unresponsive companies; and, (2) have the Business Development Representatives personally call the companies who had refused to participate. Per Mr. Toffolo's request, we drafted the letter and sent the list of the 50 refusals to him.

2. Provide invitation with advance notice.

All companies received an introductory letter from L. Brooks Patterson in advance of the survey. The identified survey respondent received an email from John Almstadt with information and instructions.

3. Respondents must have a vested interest? Respondents ask: "What's in it for me?" "How much work is it?"

We have informed all potential survey participants that we will share the survey findings. In addition, Stakeholders will be given access to an on-line customized search engine that will generate personalized reports.

4. A personalized e-mail invitation to participate can increase response rates by 7% and reduce drop-off rates by 2.6%.

Personalized professional looking color email invitations containing a link to the survey were sent to all participants. When the respondent clicks the link, their browser opens the survey which is posted on our web-site.

5. Motivation determines response rate.

We have attempted to motivate potential respondents by personally talking to them and explaining the purpose of the survey and the value it will have to Oakland County. We also offer to share the findings with them.

6. Incentives can raise response rates by 10-15%. Maastricht University (Netherlands) concluded that vouchers seem to be the most effective incentive in long questionnaires, while prize draws are more efficient for short surveys.

We have offered to share the findings with all survey participants. We have provided a search engine so stakeholders can conduct their own customized searches.

7. Importance of Follow-Up cannot be overstated

Over half of on-line survey responses are likely to arrive the first day; seven out of eight responses (88%) arrive within the first week, and nearly all (96.5%) arrive within two weeks.

The system was designed with the capability to send a reminder notice to respondents who haven't completed the survey. The final reminder notice will come from L. Brooks Patterson. Also, a phone follow-up is planned.

APPENDIX D: IMPLEMENTATION PHASE DELIVERABLE

PHASE:	<i>Phase 4 : Implmentation</i>
DELIVERABLE:	<i>Sub Phase 1: Orientation Sub Phase 2: Technical Assistance Sub Phase 3: Data Collection Sub Phase 4: Refinement and Enhancement</i>
DATE:	<i>February 12, 2009</i>

SUB PHASE DELIVERABLES

Sub Phase 1 Deliverable: Orientation

- Orient the workforce/economic development personnel, educators, and employers to the purpose and rationale of the Checklist.
- Explain how the Checklist will be used and administered.

Sub Phase 2 Deliverable: Technical Assistance

- Establish a participation support mechanism.

Sub Phase 3 Deliverable: Data Collection

- A database that collects, sorts, and tracks employer responses to the checklist
- Database compatible with Oakland County technology.
- Compile and analyze the results and disseminate to the County's workforce/economic developers and educators.

Sub Phase 4 Deliverable: Refinement and Enhancement

- A document that summarizes each phase of the project.
- Identification, by emerging business sector, industry, employer, and organization, the skills job seekers will need to qualify for, and obtain, emerging sector jobs.
- Identification, by emerging business sector, industry, employer, and organization, specific internship opportunities.
- A Checklist that is refined and enhances, based on employer responses.

METHODOLOGIES

Orientation

A variety of communication methodologies were used to orient the workforce/economic development personnel, educators and employers to the Checklist. These included an introduction letter, printed materials, mailings, emails, and live presentations.

Technical Assistance

The Project Team responded to all phone call and emails. When necessary, the team member contacted the web developer to obtain the answer or resolve the problem. Every effort was made to obtain the answer/resolve the problem within 24 hours.

Data Collection

A website was created for the purpose of communication, marketing, housing the database, and providing the electronic On-Line Forum and Survey.

Refinement and Enhancement

Survey data was analyzed and user input was evaluated in relation to the overall process to further enhance the checklist and program. The Project Team contracted with a Ph.D. statistician to ensure the validity of the survey analysis.

THE IMPLEMENTATION PHASE PROCESS

The Implementation Phase for the Skills Needs Assessment Checklist project was completed based on input provided by Stakeholders, Interviewees, and participants from the Pilot, the On-Line Forum, and Survey Data.

The Implementation Phase consisted of the following elements:

- Introduction Letter
- Identification of Contacts
- Website
- Survey Implementation and Follow-Up
- On-Line Reporting
- Refinement and Enhancement
- Survey Results

Introduction Letter

A letter of introduction from L. Brooks Patterson was sent via U.S. Mail during the Design Phase of the project, with the purpose of creating project awareness. Within the letter the leader of the organization was asked to identify the appropriate person(s) within their organization to complete the checklist(s). Three hundred (300) company addresses were supplied from Oakland County Business Development Office and over 600 from the Oakland County website.

Identification of Contacts

An extremely critical step, prior to survey implementation, was to identify the appropriate contact person within the stakeholder organization to take the survey. The two lists were compared for duplicates and the revised list consisted of 726 emerging sector companies.

Several days were spent, and multiple websites utilized, to research and compile initial contact information. Each company with a missing contact and phone number, was researched to identify an upper management person within each company. They were then mailed a personalized introductory letter from L. Brooks Patterson. Within the letter was a request to identify the best person within their company to take the survey.

To assure a high survey response rate, a combined solicitation campaign between our Call Center (manned by OCC) and our Project Team was undertaken. Over 2,000 phone calls were made, attempting to personally contact each of the 726 Emerging Sector Companies to identify by name, phone number and email address, the appropriate person within each company to participate in the survey process.

Within the 726 companies, 50 companies refused to participate, 125 were wrong numbers, numerous listings were disconnected phone numbers, and along with other difficulties in making contact. There were 409 personal contacts made with confirmations to participate in the survey. This cold-call process, was extremely labor intensive, and yielded a success rate of 20% (2000 calls to get 400 confirmed contacts).

Website

A website was created for the purpose of communication, marketing, housing the database, and providing the electronic On-Line Forum, Survey, and On-Line Reporting. The website was developed in the Design Phase and enhanced with additional features as we progressed through the phases. It can be accessed at: **www.skills-oaklandcounty.com**

The website is hosted by an independent web developer. This solution offered secure location access, backup generators, data backup and redundant internet connectivity to ensure the data was secure and the web application was available 24/7/365.



Survey Implementation and Follow-up

Once the appropriate contact was identified, an email invitation using Constant Contacts was used to invite the 409 "confirmed" survey participants to take the survey. Invitees could access the links to read the L. Brooks Patterson letter, view the website, or take the survey. Additional phone calls and emails were sent from the Project Team to obtain the highest response rate possible. In addition, the survey end-date was extended to collect maximum input.

Constant Contact is an on-line email marketing tool used to create professional-looking email newsletters. The Project Team utilized the tool for communications with survey participants. As with any survey, in order to obtain an acceptable survey response rate, repeated attempts to encourage respondents were required. The tool provided email tracking reports and allowed the team to monitor bounces, opens, clicks and various other metrics.

An overview of all Constant Contact emails is listed in the tracking report below. As you can see, there were 2209 emails sent in total indicating repeated attempts to garner participation.

Email Tracking Report: 2/20/2009

Metrics

	Sent	Bounces	Opens	Clicks	Forwards
Overall	2209	9.7% (215)	31.7% (633)	43.6% (276)	0

Emails

Date Sent	Email name	Sent	Bounces	Spam Reports	Opt-outs	Opens	Clicks	Forwards
12/15/2008	Final Request to Non-Participants	417	8.4% (35)	0	0	26.4% (101)	36.6% (37)	0
12/15/2008	Final Participation Request	62	0	0	0	37.1% (23)	26.1% (6)	0
12/1/2008	L. Brooks Patterson Follow-up email	520	6.9% (36)	0	0.4% (2)	37.6% (182)	43.4% (79)	0
11/6/2008	Implementation Reminder Email	572	9.8% (56)	0	0.2% (1)	24.8% (128)	39.1% (50)	0
10/22/2008	Implementation Email	409	12.5% (51)	0	0.5% (2)	41.9% (150)	56.0% (84)	0
10/22/2008	Implementation Email - Unconfirmed	191	17.8% (34)	0	0.5% (1)	19.1% (30)	30.0% (9)	0
9/22/2008	Pilot Reminder Notice	27	11.1% (3)	0	3.7% (1)	41.7% (10)	60.0% (6)	0
9/15/2008	Oakland County Skills Pilot Survey	11	0	0	0	72.7% (8)	62.5% (5)	0

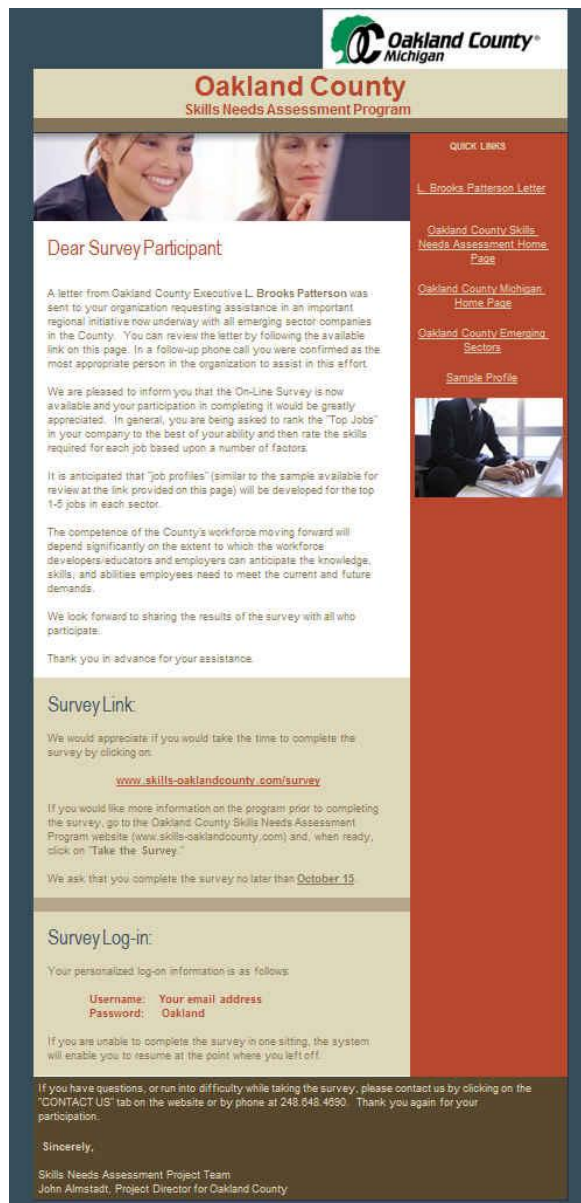
Key

- » **Sent** The total emails sent, including bounces.
- » **Bounces** Emails sent, but not received by your contacts.
- » **Bounced percent** Number of bounced emails divided by the number sent.
- » **Spam Reports** Number of complaints received from an email.
- » **Opt-outs** Contacts who moved themselves to your Do Not Mail List.
- » **Opt-out percent** Number of opt-outs divided by the number sent.
- » **Opens** Trackable emails your contacts received and viewed.
- » **Opened percent** Number of opened emails divided by the number sent.
- » **Clicks** Contacts who clicked from an email to your website.
- » **Click-through percent** .. Number of click-throughs divided by the number opened.
- » **Forwards** Number of times the email was forwarded using the Forward Email to a Friend link.

Implementation Communication

The email marketing campaign began with two Implementation emails in late October 2008. The first was to companies that had been contacted and confirmed for participation. The second was to companies for which we had email addresses and contact information but had not been confirmed. The Implementation email was sent to 600 contacts. Considerable time and effort was made to manage and correct bounced emails, field contact questions, and make changes to contact information.

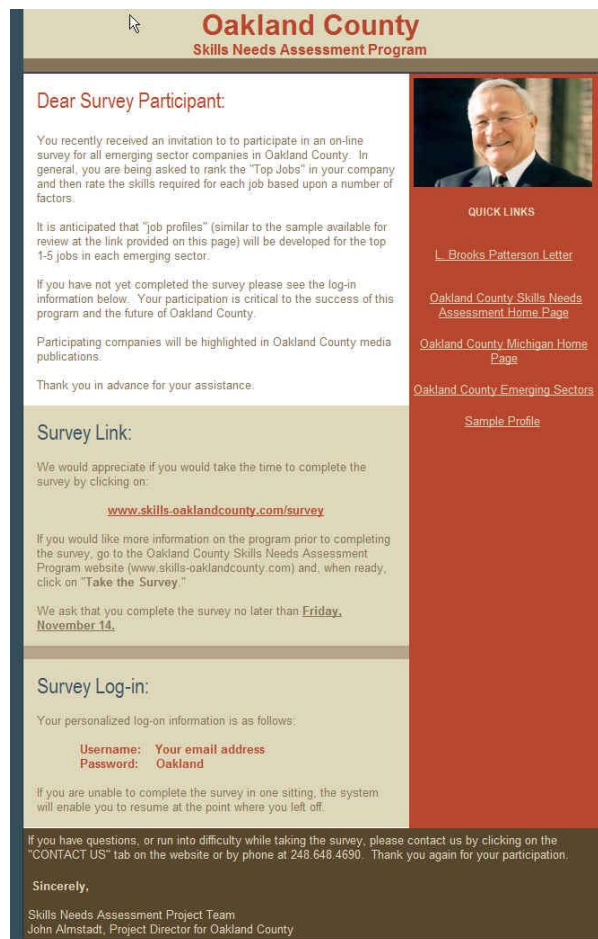
Date Sent	Email name	Sent	Bounces	Spam Reports	Opt-outs	Opens	Clicks	Forwards
10/22/2008	Implementation Email	409	12.5% (51)	0	0.5% (2)	41.9% (150)	56.0% (84)	0
10/22/2008	Implementation Email - Unconfirmed	191	17.8% (34)	0	0.5% (1)	19.1% (30)	30.0% (9)	0



Implementation Email

Approximately 2 weeks after the initial implementation email, a follow up reminder email was sent to 572 contacts. The message was refined and L. Brooks Patterson's picture was added to the communication. The number of company contacts was narrowed due to issues such as non-existent email addresses, full mailboxes, opt-outs, and emails blocked by the company Internet Service Provider (ISP).

	Email name	Sent	Bounces	Spam Reports	Opt-outs	Opens	Clicks	Forwards
11/6/2008	Implementation Reminder Email	572	9.8% (56)	0	0.2% (1)	24.8% (128)	39.1% (50)	0



**Implementation
Reminder Email**

In late November 2008 it was decided that a personal email from L. Brooks Patterson would demonstrate the significance of the survey to the county and thereby encourage contacts to participate. The communication was drafted less like a marketing piece and more like a personalized email. Each contacts name appeared at the top of the note. The L. Brooks Patterson follow-up email was sent to 520 contacts.

	Email name	Sent	Bounces	Spam Reports	Opt-outs	Opens	Clicks	Forwards
12/1/2008	L. Brooks Patterson Follow-up email	520	6.9% (36)	0	0.4% (2)	37.6% (182)	43.4% (79)	0



Dear Kristina,

In October, you received the Skills Needs Assessment survey regarding our Emerging Sectors Program in Oakland County. I appreciate the time constraints you all face; however, I need your help in identifying the skill sets that will be required to help Oakland County businesses as the economy recovers. Only you, as a business owner, can help us accurately identify these skills.

This powerful one-of-a-kind survey tool was developed to provide workforce developers and educators with a better understanding of the skills that job seekers will need to satisfy emerging sector demand. While I recognize that the survey tool will require some time and thought, we are convinced it will result in a unique county-wide partnership between workforce developers, educators, and industry.

To access the survey, go to www.skills-oaklandcounty.com and click "Take the Survey." Use your email address and the password OAKLAND to begin the survey.

Thank you for supporting the future of Oakland County.

L. Brooks Patterson

**L. Brooks
Patterson
Follow-up
Email**

The final email communication was sent out on December 15, 2008. There were two distinct emails targeted at two different groups. The first email was targeted to contacts that had started the survey but never finished it. The second email was targeted at contacts that had never started the survey. This second email was different from the previous requests to participate as it only asked contacts to select top jobs verses completing the survey in its entirety.

Date Sent	Email name	Sent	Bounces	Spam Reports	Opt-outs	Opens	Clicks	Forwards
12/15/2008	Final Request to Non-Participants	417	8.4% (35)	0	0	26.4% (101)	36.6% (37)	0
12/15/2008	Final Participation Request	62	0	0	0	37.1% (23)	26.1% (6)	0

Oakland County

Skills Needs Assessment Program

Dear Survey Participant:

Recently you received a request from Oakland County Executive, L. Brooks Patterson, to participate in the Skills Needs Assessment on-line survey for all emerging sector companies.

We are aware that you have selected a number of "TOP JOBS" for your company but have not yet completed a survey instrument(s), or you may have a survey "in-progress." As we collect the final data for further analysis, it would be appreciated if you would return to the website to finalize your survey feedback.

If time constraints prohibit you from completing a survey for all of the "TOP JOBS" you have selected, please identify the MOST CRITICAL occupation(s) and complete the corresponding survey.

All surveys must be completed by **Friday, December 19**.

Participating companies will be highlighted in Oakland County media publications.

Thank you in advance for your assistance.



QUICK LINKS

- [L. Brooks Patterson Letter](#)
- [Oakland County Skills Needs Assessment Home Page](#)
- [Oakland County Michigan Home Page](#)
- [Oakland County Emerging Sectors](#)
- [Sample Profile](#)

Survey Link:

Please access the survey by clicking on:

www.skills-oaklandcounty.com/survey

If you would like more information on the program prior to completing the survey, go to the Oakland County Skills Needs Assessment Program website (www.skills-oaklandcounty.com) and, when ready, click on "Take the Survey."

Survey Log-in:

Your personalized log-on information is as follows:

Username: Your email address
Password: Oakland

If you are unable to complete the survey in one sitting, the system will enable you to resume at the point where you left off.

If you have questions, or run into difficulty while taking the survey, please contact us by clicking on the "CONTACT US" tab on the website or by phone at 248.648.4690. Thank you again for your participation.

Sincerely,

Skills Needs Assessment Project Team
John Almstadt, Project Director for Oakland County

Final Participation Request

Oakland County

Skills Needs Assessment Program

Dear Survey Participant

Recently you received a request from Oakland County Executive, L. Brooks Patterson, to participate in the Skills Needs Assessment on-line survey for all emerging sector companies.

We are aware that you have not yet completed the survey and are still in need of your assistance. Presently, we are in the midst of collecting the final data for further analysis.

We would appreciate it if you would access the survey through the link below and complete a survey(s) for the occupations MOST CRITICAL to your company's future.

If time constraints prohibit you from completing a survey in its entirety, please access the website and select the "TOP JOBS" related to your company at a minimum.

All survey responses must be completed by **Friday, December 19**.

Participating companies will be highlighted in Oakland County media publications.

Thank you in advance for your assistance.



QUICK LINKS

- [L. Brooks Patterson Letter](#)
- [Oakland County Skills Needs Assessment Home Page](#)
- [Oakland County Michigan Home Page](#)
- [Oakland County Emerging Sectors](#)
- [Sample Profile](#)

Survey Link

Please access the survey by clicking on:

www.skills-oaklandcounty.com/survey

If you would like more information on the program prior to completing the survey, go to the Oakland County Skills Needs Assessment Program website (www.skills-oaklandcounty.com) and, when ready, click on "Take the Survey."

Survey Log-in:

Your personalized log-on information is as follows:

Username: Your email address
Password: Oakland

If you are unable to complete the survey in one sitting, the system will enable you to resume at the point where you left off.

If you have questions, or run into difficulty while taking the survey, please contact us by clicking on the "CONTACT US" tab on the website or by phone at 248.648.4690. Thank you again for your participation.

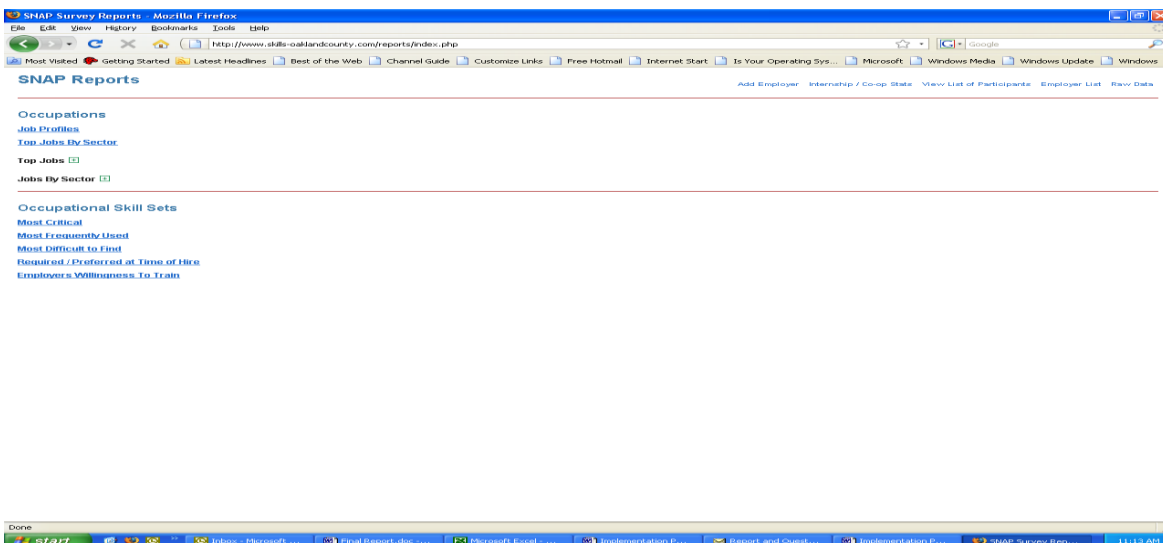
Sincerely,

Skills Needs Assessment Project Team
John Almstadt, Project Director for Oakland County

Final Request to Non-Participants

On-Line Reporting

In addition to the hard copy and web hosted Checklists/Profiles, an On-Line Reporting function was created to enable key stakeholders (Educators, Employers and Workforce Development) to request customized reports, using the website reporting feature. This data is available "real-time" and the database will be maintained by Oakland County.



Users approved by Oakland County will be assigned a Username and Password in order to enter this secure site.

The types of reports that can be generated include:

<i>Job Profile</i>	User can select a Sector and a Job, and generate a Job Profile.
<i>Top Jobs by Sector</i>	User selects a Sector (or All Sectors) and a list of Top Jobs within a sector will be displayed.
<i>Most Critical</i>	User selects a "Category" (or All Categories) (Knowledge, Skill, Ability, etc.) and a Sector (or All Sectors), and generates a report showing the most critical expertise within a Category of a specific Sector.
<i>Most Frequently Used</i>	User selects a Category (or All Categories) and a Sector (or All Sectors) and generates the most frequently used expertise within the Category (knowledge, skill, ability, etc.) will be displayed.
<i>Most Difficult to Find</i>	User selects a Category (or All Categories) and a Sector (or All Sectors) and the most difficult to find expertise within a Category will be displayed.
<i>Required/Preferred at Time of Hire</i>	User selects "Required" or "Preferred," chooses a Category (or All categories) and identifies a sector (or All Sectors). A report will show the expertise Required or Preferred at time of hire, within a Category of a specific Sector.
<i>Employers Willing to Train</i>	User selects a Category (or Categories) and Sector (or Sectors) and generates a report showing the expertise employers are willing to train, within a Category of a specific Sector.

Refinement and Enhancement

Throughout the many project phases, numerous Checklist/Profile revisions were made to "content" and to enhance "user-friendliness." An example of the latest, and final, version of a Profile/Checklist is shown attached.

(A copy of the refined and enhanced Job Profile was included in the final deliverable. Please see the Survey Results section of this report for the completed documents).

APPENDIX E: CHANGE CONTROL DOCUMENT

SNAP CHANGE CONTROL DOCUMENT

#	Suggestion		Date	Comments
1	Change the heading on the profile from Occupation to Job	N	6/9/08	Headings used by the DOL are accepted terminology
2	Change the heading on the profile Personal Characteristics to Personal Attributes	Y	6/9/08	Done 6/10
3	Change the heading on the profile from Education Level to Educational Level	Y	6/9/08	Done 6/10
4	Change the heading on the profile from Concentration to Area of Concentration/Major	Y	6/9/08	Done 6/10
5	On the profile, display Local Wages, rather than National Wages	N	6/9/08	Not easily accessible; Michigan wages displayed
6	Use terminology Career Pathway and Career Terms	N	6/9/08	Not "Common Language" to all stakeholder groups
7	Adv. Mfg. Sector - add Process Engineer occupation	Y	6/9/08	Will add to on-line forum
8	Adv. Mfg. Sector - change Helpers-Production to Production Associate or Production Technician	Y	6/9/08	Will add to on-line forum
9	Adv. Mfg. Sector - add Cutters and Sewers	Y	6/9/08	Will add to on-line forum
10	Adv. Mfg. Sector - add Chemical Engineer	Y	6/9/08	Will add to on-line forum
11	Adv. Mfg. Sector - change Electronic Drafters to Product Designers and add Detailer as alternate title. Add Process Engineer occupation.	Y	6/9/08	Will add to on-line forum
12	Adv. Mfg. Sector - add Systems Engineer	Y	6/9/08	Will add to on-line forum
13	Adv. Mfg. Sector - add Simulation Engineer	Y	6/9/08	Will add to on-line forum
14	Adv. Mfg. Sector - add Factory Simulation and Plant Automation	Y	6/9/08	Will add to on-line forum
15	Add Sector Aeronautics	Y	6/9/08	Subset of Aerospace; will add to Forum
16	Aerospace Sector - Aerospace Engineers – Digital Mock-up / visualization. Skills or additional Jobs??	Y	6/9/08	Will add to on-line forum
17	Aerospace Sector - add Product Design Engineer	Y	6/9/08	Will add to on-line forum
18	Aerospace Sector - add CAD skills to design engineers	Y	6/9/08	Will add to on-line forum
19	Energy Sector - add Assemblers and Technicians as alternate titles for Helpers-Production Workers (see Control #8 and do the same). Or, is this a new occupation?	Y	6/9/08	Will add to on-line forum
20	Energy Sector - add Mechanical Engineers	Y	6/9/08	Will add to on-line forum
21	Energy Sector - add Electrical Engineers	Y	6/9/08	Will add to on-line forum

22	Energy Sector - add Scientists	Y	6/9/08	Will add to on-line forum
23	Energy Sector - add Physicists	Y	6/9/08	Will add to on-line forum
24	Energy Sector - add Finance	N	6/9/08	Administrative position; not sector specific. Skills are transferable.
25	Energy Sector - add Quality, both engineered and technical support.	Y	6/9/08	Will add to on-line forum
26	Comm. & IT Sector - add separate titles to designate specialties: JAVA, J2EE, .NET	N	6/9/08	Skills within a job; not separate occupations.
27	Comm. & IT Sector - for Computer Software Engineers, add alternate titles of Application Consultants and Solution Architects.	Y	6/9/08	Will add to on-line forum
28	Comm. & IT Sector - add Senior Systems Analyst (skill is more technical than business related).	Y	6/9/08	Will add to on-line forum
29	Comm. & IT Sector - delete Computer Support Specialist title and create two titles to replace it: Technical Support Specialists (less customer contact, more technical) and Customer Support Specialists (more customer contact, less technical). Alternate title would be User Support Specialist.	Y	6/9/08	Will add to on-line forum
30	Comm. & IT Sector - within the software environment, need to be ITIL Certified.	N	6/9/08	Skill only - not a separate occupation
31	Comm. & IT Sector - Network Systems Analysts and Data Communications Analysts : add MicroSoft Certification (MCSE, MCS).	N	6/9/08	This is a skill, not a separate occupation.
32	Comm. & IT Sector - Need to keep Communications people separate from Network people.	Y	6/9/08	This is a comment and we agree.
33	Comm. & IT Sector - Network and Computer Systems Administrators are becoming obsolete.	Y	6/9/08	This is a comment and we agree.
34	Comm. & IT Sector - add Software Developers and multiple jobs by environment (JAVA, .NET, etc.) - see Control # 26.	N	6/9/08	Skill only - not a separate occupation
35	Comm. & IT Sector - change Computer and Information Systems Managers to two jobs: Application Development Manager and Technical Systems and Networking Manager.	Y	6/9/08	Will add to on-line forum
36	Comm. & IT Sector -add Business Process Consultants.	Y	6/9/08	Will add to on-line forum
37	Comm. & IT Sector - add Global Engagement Managers.	N	6/9/08	Will not create jobs based on "geography." Use Engagement Mgr. Will add to Forum.
38	Comm. & IT Sector - CAD/PLM Applications Consultants - add CAD Skills to Engineers.	Y	6/9/08	Will add to Forum
39	Functionality - 6.1.1.1; List skills in 3 areas: technical, academic, workplace/soft skills.	Y	NA	Part of original proposal
40	Functionality - 6.1.1.3; A quick, easy to fill out, list of various skills that companies can check off what they need (like a menu of skills) that they can pick and choose from.	N	5/30/08	Future enhancement
41	Functionality - 6.1.1.7; Internet for easy access and manipulation	Y	NA	Part of original proposal
42	Functionality - 6.1.1.10; A list of competencies/skills that an	Y	NA	Part of original proposal

	individual should possess to be successful in an employment situation. In the best scenario, the list should be prioritized as to importance of the skills/competencies.			
43	Functionality - 6.1.1.12; Consistent for each sector, consistent for all user, each level of education could do what they are capable and the student could use it to see the path they need to go on .	Y	NA	Part of original proposal
44	Functionality - 8.1.1.4; Be able to sort by company/industry.	N	5/30/08	Able to sort by sector and occupation
45	Functionality - 8.1.1.6; USDOL model in its entirety would be ideal.	N	5/30/08	The USDOL model is not fully developed. Will add this and other Links to our website
46	Functionality - 8.1.1.8; Maintained and kept current.	N		This is Out-of-Scope. The data will be kept on our server for a period of 3 mos. after project completion. Data can be transferred to the Oakland County servers, however, there is currently no provision for "maintaining and updating."
47	Functionality - 8.1.1.11; Allow companies to have electronic feedback (like the comment section on Hotels.com).	Y	NA	Part of original proposal
48	Functionality - 8.1.1.13; We will use the checklist as a resource to share with our teachers and students. It needs to be kept up-to-date and available electronically.	N		This is Out-of-Scope. The data will be kept on our server for a period of 3 mo. After the project completion. Data can be transferred to the Oakland County servers, however, there is currently no provision for "maintaining and updating"
49	Functionality - 8.1.1.14; Should contain links to related information/sites.	Y	NA	Part of original proposal
50	Functionality - 8.1.1.16; Making sure educators and students are familiar with it and using it to plan their programs and their class selection (perhaps for students as part of registration).	N	NA	This is Out-of-Scope and not part of the RFP deliverables; Requires a marketing/communication plan and an infrastructure in place to ensure its use.
51	Functionality - 8.1.1.20; Be able to crosswalk with existing curriculum to see where the matches are, to be able to add items to the curriculum where needed. From that to create the training plans needed for students to obtain skills and move their career forward to the next level post-secondary and work. I want to use the checklist to save time and funding by putting things in place that are not relevant and keeping things in place that are preparing the student incorrectly.	Y	NA	Part of original proposal. Can be used as a checklist for the academic community to assess whether an existing program/curriculum is meeting the skill requirements of industry sectors, or to ensure new programs contain these emerging skills/competencies.
52	Functionality - 8.1.1.21; The marketing of this is key – to all parties involved, as well as to our future business community.	N	NA	This is out-of-scope and not part of the RFP deliverables; requires a marketing/communication plan and an infrastructure in place to ensure its use.
53	Functionality - 8.1.1.22; The ability to look at skills that work in more than one sector (cross training?).	N	5/30/08	This is out-of-scope, but could be a Future enhancement

54	Functionality - 8.1.1.24; Key word searches to connect occupations and skills.		5/30/08	System will have the ability to do "key word" searches; results will indicate what occupation the skill (s) appear in, but will not link skills to occupations. This could be a future enhancement.
55	Multiple comments indicating the term "Checklist" was confusing. The project team spent considerable time with an explanation.		5/30/08	Begin referring to the skills document as a Skills "Profile."
56	Robotics & Automation: Add Project Manager	Y	6/12/08	Will add to on-line forum
57	Robotics & Automation: Add Systems Engineer	Y	6/12/08	Will add to on-line forum
58	Medical Devices + other: Add Sales	Y	6/12/08	Will add to on-line forum
59	Medical Devices: Add Clinical Managers	Y	6/12/08	Will add to on-line forum
60	Education: Add GPA to Profile	N	6/12/08	GPA is not a universal benchmark
61	Distinguish between "Required" and "Desired" in all areas on the Profile.	Y	6/12/08	Imbedded into tool - surveys for "criticality" of skill
62	Use the term "Behaviorial" on the Profile.	N	7/2/08	Descriptions are written in behavioral terms
63	Education: Separate Entry Level from On-going.	N	7/2/08	Varies by company
64	Education: List schools who offer the required program.	N	7/2/08	This is out-of-scope and not part of the RFP deliverables; Would need to determine if Oakland County Schools only, Michigan schools, U.S. schools, etc.; Could be a future enhancement.
65	Identify Education as "Required" or "Preferred"	N	7/2/08	Varies by company
66	List the Career Progression (upward or lateral). What's the next logical move for someone in this position?	N	7/2/08	Varies by company
67	Workforce Development Board Meeting discussion on Automotive R&D, Healthcare, Hospitality and Green Construction Sectors.	N	7/16/08	This is out-of-scope and not part of the RFP deliverables. Could be a future enhancement.
68	Workforce Development Board comment about "re-skilling" Construction to Green Construction.	N	7/16/08	This is out-of-scope and not part of the RFP deliverables. Could be a future enhancement.
69	Add a question(s) on the survey relating to the importance of appearance and dress, as well as the use of cell phones.	Y	8/6/08	These are items that vary by company and would be best addressed by company policy/handbook; however, we will add these questions to the Forum.
70	Add eLearning to survey under trainability.	N	8/18/08	eLearning is a delivery method; would require addition of all types of delivery methods.
71	Add Bilingual requirement on Checklist/profile.s	Y	8/18/08	Added language requirements to the checklist/profile.
72	Add intercultural skills to the checklist.	Y	9/11/08	Created and added four (4)

				intercultural abilities to the checklist and survey.
73	Create explanation of how the Job expectations and Training Mode columns work.	Y	9/18/08	Created explanation of both columns accessed by use of mouse-over.
74 - 86	Misc. suggestions dealing with small improvements to make the survey more user-friendly.	Y	9/18/08	Instituted 13 changes to enhance the user-friendliness of the survey.

APPENDIX F: ANOVA VARIANCE ANALYSIS

Below is an Analysis of Variance (ANOVA) for each of the key skill questions for the top tier global job skills. The sets of tables below report the descriptive statistics for each of the skill questions along with the results of the ANOVA F-tests which indicated whether the average ratings for each skill question are significantly different from each other. The final column of the ANOVA table (labeled sig.) provides the probability the mean values for each of the questions are statistically interchangeable. Any probability less than .05 is considered to be statistically significant meaning that the means are statistically distinct. This same information can be observed in the lower and upper bounds of the 95% confidence intervals. Non-overlapping intervals indicate that the mean values are statistically distinct. One notable pattern in these analyses is that the question “how frequently is this skill used” is often missing. However, this question is missing largely for skills that are personal attributes or traits that would influence the manner in which an employee did their job rather than a specific skill to be implemented.

Reading Comprehension:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.2917	1.09592	.09133	3.1111	3.4722	1.00	5.00
<i>How important is it</i>	4.3020	.91315	.07481	4.1542	4.4498	1.00	5.00
<i>How often is it used</i>	4.1875	.95323	.07944	4.0305	4.3445	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	88.844	2	44.422	45.352	.000
<i>Within Groups</i>	425.097	434	.979		
<i>Total</i>	513.941	436			

Critical Thinking:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.8154	.89603	.07859	3.6599	3.9709	1.00	5.00
<i>How important is it</i>	4.3852	.81024	.06973	4.2473	4.5231	1.00	5.00
<i>How often is it used</i>	4.1705	.91961	.08097	4.0103	4.3308	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	21.867	2	10.934	14.260	.000
<i>Within Groups</i>	299.788	391	.767		
<i>Total</i>	321.655	393			

Active Learning:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.5538	.87215	.07649	3.4025	3.7052	2.00	5.00
<i>How important is it</i>	4.1852	.89096	.07668	4.0335	4.3368	2.00	5.00
<i>How often is it used</i>	4.0153	.98438	.08601	3.8451	4.1854	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	28.110	2	14.055	16.715	.000
<i>Within Groups</i>	330.463	393	.841		
<i>Total</i>	358.573	395			

Problem Sensitivity:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.5938	.99951	.08834	3.4189	3.7686	1.00	5.00
<i>How important is it</i>	4.3308	.87665	.07602	4.1805	4.4812	1.00	5.00
<i>How often is it used</i>	3.9922	1.01931	.08975	3.8147	4.1698	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	35.481	2	17.741	19.002	.000
<i>Within Groups</i>	361.311	387	.934		
<i>Total</i>	396.792	389			

Active Listening:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6172	1.01268	.08951	3.4401	3.7943	1.00	5.00
<i>How important is it</i>	4.4030	.77672	.06710	4.2703	4.5357	2.00	5.00
<i>How often is it used</i>	4.2713	.80770	.07111	4.1306	4.4120	2.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	45.923	2	22.962	30.305	.000
<i>Within Groups</i>	293.985	388	.758		
<i>Total</i>	339.908	390			

English Language (N=135: 143: 134)

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	2.8889	1.23788	.10654	2.6782	3.0996	1.00	5.00
<i>How important is it</i>	4.3427	.86484	.07232	4.1997	4.4856	1.00	5.00
<i>How often is it used</i>	4.3881	.89199	.07706	4.2356	4.5405	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	197.808	2	98.904	96.922	.000
<i>Within Groups</i>	417.364	409	1.020		
<i>Total</i>	615.172	411			

Attention to Detail:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6829	.92610	.08350	3.5176	3.8482	2.00	5.00
<i>How important is it</i>	4.6512	.65730	.05787	4.5367	4.7657	2.00	5.00
<i>How often is it used</i>	4.5726	.68874	.06185	4.4502	4.6950	2.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	71.930	2	35.965	61.456	.000
<i>Within Groups</i>	218.283	373	.585		
<i>Total</i>	290.213	375			

Dependability:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.5000	.98590	.08783	3.3262	3.6738	1.00	5.00
<i>How important is it</i>	4.6970	.59179	.05151	4.5951	4.7989	2.00	5.00
<i>How often is it used</i>	4.6929	.52722	.04678	4.6003	4.7855	3.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	121.042	2	60.521	114.223	.000
<i>Within Groups</i>	202.402	382	.530		
<i>Total</i>	323.444	384			

Oral Expression:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.2583	1.06507	.09723	3.0658	3.4509	1.00	5.00
<i>How important is it</i>	4.4252	.77172	.06848	4.2897	4.5607	1.00	5.00
<i>How often is it used</i>	4.2975	.81286	.07390	4.1512	4.4438	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	99.677	2	49.838	62.875	.000
<i>Within Groups</i>	289.320	365	.793		
<i>Total</i>	388.997	367			

Mathematics: (N = 122: 125: 123)

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.3279	1.02403	.09271	3.1443	3.5114	1.00	5.00
<i>How important is it</i>	3.8720	1.08491	.09704	3.6799	4.0641	1.00	5.00
<i>How often is it used</i>	3.6911	1.13895	.10270	3.4878	3.8944	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	18.913	2	9.457	8.051	.000
<i>Within Groups</i>	431.097	367	1.175		
<i>Total</i>	450.011	369			

Deductive Reasoning:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6154	.87932	.08129	3.4544	3.7764	2.00	5.00
<i>How important is it</i>	4.2562	.85175	.07743	4.1029	4.4095	2.00	5.00
<i>How often is it used</i>	4.1538	.86717	.08017	3.9951	4.3126	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	27.974	2	13.987	18.651	.000
<i>Within Groups</i>	263.981	352	.750		
<i>Total</i>	291.955	354			

Oral Comprehension:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.3600	.97881	.08755	3.1867	3.5333	1.00	5.00
<i>How important is it</i>	4.3000	.82264	.07215	4.1572	4.4428	1.00	5.00
<i>How often is it used</i>	4.2240	.86008	.07693	4.0717	4.3763	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	68.727	2	34.364	43.499	.000
<i>Within Groups</i>	297.828	377	.790		
<i>Total</i>	366.555	379			

Integrity:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.5478	1.11798	.10425	3.3413	3.7543	1.00	5.00
<i>How important is it</i>	4.7647	.62036	.05687	4.6521	4.8773	1.00	5.00
<i>How often is it used</i>	4.6870	.71776	.06693	4.5544	4.8195	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	107.474	2	53.737	75.388	.000
<i>Within Groups</i>	246.629	346	.713		
<i>Total</i>	354.103	348			

Cooperation:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.4000	.93471	.08716	3.2273	3.5727	1.00	5.00
<i>How important is it</i>	4.4215	.72746	.06613	4.2905	4.5524	2.00	5.00
<i>How often is it used</i>	4.3304	.75767	.07065	4.1905	4.4704	2.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	74.313	2	37.156	56.577	.000
<i>Within Groups</i>	228.548	348	.657		
<i>Total</i>	302.860	350			

Written Comprehension:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.3333	.94708	.08989	3.1552	3.5115	1.00	5.00
<i>How important is it</i>	4.3361	.84650	.07760	4.1825	4.4898	1.00	5.00
<i>How often is it used</i>	4.2124	.93971	.08840	4.0372	4.3875	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	67.585	2	33.792	40.725	.000
<i>Within Groups</i>	282.124	340	.830		
<i>Total</i>	349.708	342			

Inductive Reasoning:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.7596	.92951	.09115	3.5788	3.9404	1.00	5.00
<i>How important is it</i>	4.1284	.88298	.08457	3.9608	4.2961	1.00	5.00
<i>How often is it used</i>	3.9143	.98170	.09580	3.7243	4.1043	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	7.321	2	3.661	4.217	.016
<i>Within Groups</i>	273.421	315	.868		
<i>Total</i>	280.742	317			

Analytical Thinking:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6321	.89789	.08721	3.4592	3.8050	2.00	5.00
<i>How important is it</i>	4.4865	.74912	.07110	4.3456	4.6274	1.00	5.00
<i>How often is it used</i>	4.2870	.79779	.07677	4.1349	4.4392	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	43.007	2	21.503	32.283	.000
<i>Within Groups</i>	214.483	322	.666		
<i>Total</i>	257.489	324			

Speech Clarity:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.2336	1.04231	.10076	3.0339	3.4334	1.00	5.00
<i>How important is it</i>	4.1455	.94662	.09026	3.9666	4.3243	1.00	5.00
<i>How often is it used</i>	4.1589	.90230	.08723	3.9859	4.3318	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	60.459	2	30.229	32.439	.000
<i>Within Groups</i>	299.131	321	.932		
<i>Total</i>	359.590	323			

Complex Problem Solving:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.7895	.84921	.08713	3.6165	3.9625	2.00	5.00
<i>How important is it</i>	4.3299	.80002	.08123	4.1687	4.4911	2.00	5.00
<i>How often is it used</i>	4.0208	.96223	.09821	3.8259	4.2158	1.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	14.128	2	7.064	9.270	.000
<i>Within Groups</i>	217.191	285	.762		
<i>Total</i>	231.319	287			

Persistence:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6122	.92650	.09359	3.4265	3.7980	2.00	5.00
<i>How important is it</i>	4.2871	.84067	.08365	4.1212	4.4531	2.00	5.00
<i>How often is it used</i>	4.0909	.92682	.09315	3.9061	4.2758	2.00	5.00

ANOVA ^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	23.880	2	11.940	14.792	.000
<i>Within Groups</i>	238.120	295	.807		
<i>Total</i>	262.000	297			

Adaptability/Flexibility:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.5319	.96945	.09999	3.3334	3.7305	1.00	5.00
<i>How important is it</i>	4.1633	.93824	.09478	3.9752	4.3514	1.00	5.00
<i>How often is it used</i>	4.0105	1.02620	.10529	3.8015	4.2196	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	20.678	2	10.339	10.804	.000
<i>Within Groups</i>	271.781	284	.957		
<i>Total</i>	292.460	286			

Initiative:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.7303	.86292	.09147	3.5486	3.9121	2.00	5.00
<i>How important is it</i>	4.3830	.79117	.08160	4.2209	4.5450	1.00	5.00
<i>How often is it used</i>	4.2444	.89079	.09390	4.0579	4.4310	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	21.402	2	10.701	14.866	.000
<i>Within Groups</i>	194.363	270	.720		
<i>Total</i>	215.766	272			

Intercultural Awareness:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.2366	1.08746	.11276	3.0126	3.4605	1.00	5.00
<i>How important is it</i>	3.7000	1.14150	.11415	3.4735	3.9265	1.00	5.00
<i>How often is it used</i>	3.5474	1.18293	.12137	3.3064	3.7883	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	10.667	2	5.334	4.116	.017
<i>Within Groups</i>	369.333	285	1.296		
<i>Total</i>	380.000	287			

Intercultural Sensitivity:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.1935	1.04526	.10839	2.9783	3.4088	1.00	5.00
<i>How important is it</i>	3.6020	1.20771	.12200	3.3599	3.8442	1.00	5.00
<i>How often is it used</i>	3.3895	1.23163	.12636	3.1386	3.6404	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	7.974	2	3.987	2.934	.055
<i>Within Groups</i>	384.585	283	1.359		
<i>Total</i>	392.559	285			

Information Ordering:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.3913	.97165	.10130	3.1901	3.5925	1.00	5.00
<i>How important is it</i>	3.8854	.97192	.09920	3.6885	4.0823	1.00	5.00
<i>How often is it used</i>	3.7742	1.04392	.10825	3.5592	3.9892	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	12.531	2	6.265	6.313	.002
<i>Within Groups</i>	275.911	278	.992		
<i>Total</i>	288.441	280			

Near Vision:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	2.7634	1.28027	.13276	2.4998	3.0271	1.00	5.00
<i>How important is it</i>	3.8283	1.19557	.12016	3.5898	4.0667	1.00	5.00
<i>How often is it used</i>	3.9247	1.11547	.11567	3.6950	4.1545	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	77.857	2	38.929	27.083	.000
<i>Within Groups</i>	405.350	282	1.437		
<i>Total</i>	483.207	284			

Intercultural Competence:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.2841	.93402	.09957	3.0862	3.4820	1.00	5.00
<i>How important is it</i>	3.8901	1.15903	.12150	3.6487	4.1315	1.00	5.00
<i>How often is it used</i>	3.6897	1.17444	.12591	3.4393	3.9400	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	16.986	2	8.493	7.082	.001
<i>Within Groups</i>	315.420	263	1.199		
<i>Total</i>	332.406	265			

Independence:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.5294	.97086	.10530	3.3200	3.7388	1.00	5.00
<i>How important is it</i>	4.0581	1.05557	.11382	3.8318	4.2845	1.00	5.00
<i>How often is it used</i>	3.9647	1.04023	.11283	3.7403	4.1891	2.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	13.579	2	6.790	6.488	.002
<i>Within Groups</i>	264.780	253	1.047		
<i>Total</i>	278.359	255			

Computers and Electronics:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.3049	1.09645	.12108	3.0640	3.5458	1.00	5.00
<i>How important is it</i>	3.6067	1.37855	.14613	3.3163	3.8971	1.00	5.00
<i>How often is it used</i>	3.5122	1.34480	.14851	3.2167	3.8077	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	4.029	2	2.014	1.225	.296
<i>Within Groups</i>	411.102	250	1.644		
<i>Total</i>	415.130	252			

Intercultural Intelligence:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.2821	.93832	.10624	3.0705	3.4936	1.00	5.00
<i>How important is it</i>	3.4878	1.22971	.13580	3.2176	3.7580	1.00	5.00
<i>How often is it used</i>	3.4103	1.15585	.13087	3.1497	3.6709	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	1.719	2	.860	.689	.503
<i>Within Groups</i>	293.154	235	1.247		
<i>Total</i>	294.874	237			

Judgment and Decision Making:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6486	.92799	.10788	3.4337	3.8636	1.00	5.00
<i>How important is it</i>	4.2857	.85620	.09757	4.0914	4.4800	1.00	5.00
<i>How often is it used</i>	4.0400	1.04545	.12072	3.7995	4.2805	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	15.536	2	7.768	8.685	.000
<i>Within Groups</i>	199.459	223	.894		
<i>Total</i>	214.996	225			

Engineering and Technology:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.6438	.88772	.10390	3.4367	3.8510	2.00	5.00
<i>How important is it</i>	4.1818	.88448	.10080	3.9811	4.3826	2.00	5.00
<i>How often is it used</i>	4.0000	.91026	.10803	3.7845	4.2155	2.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	11.154	2	5.577	6.980	.001
<i>Within Groups</i>	174.194	218	.799		
<i>Total</i>	185.348	220			

Troubleshooting:

	Mean	Standard Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
<i>How hard is it to find</i>	3.7794	.99018	.12008	3.5397	4.0191	1.00	5.00
<i>How important is it</i>	4.3571	.85186	.10182	4.1540	4.5603	2.00	5.00
<i>How often is it used</i>	4.0882	1.08910	.13207	3.8246	4.3519	1.00	5.00

ANOVA^a	Sum of Squares	df	Mean Square	F	Sig.
<i>Between Groups</i>	11.524	2	5.762	5.991	.003
<i>Within Groups</i>	195.233	203	.962		
<i>Total</i>	206.757	205			

APPENDIX G: PROJECT STAKEHOLDERS

STAKEHOLDER NAME	ORGANIZATION
Agius, Traci	Michigan Works!
Aukee, Mary Kaye	Oakland Schools
Beckner, Allen	Oakland Schools
Bertolini, Phil	ConnecTech
Cathcart, Susan	Baker College
Claxton, Scott	ESYS Corporation
Coffey, Rod	Microposite
Desando, Giulio	INCAT
Hill, Roland	Michigan Works!
Kaltz, Dorothy	Michigan Works!
Kaminski, Jerry	American Axle and ASTD
Kaye, Shelley	Oakland Community College
Keebaugh, Lori	Waterford School District
Krauss, Maureen	Oakland County PEDS
LeJeune, Richard	INCAT
Livermore, Jeff	Walsh College
Love, Jeff	Baker College
Maccagone, Dave	Multi Bank Securities
Marcotte, Robyn	ePrize
Miller, Sharon	Oakland Community College
Murphy, Chris	Jervis B. Webb
Okma, Bert	International Academy
Paine, Brenda	Oakland University
Poploskie, Jon	BridgeSpeak, LLC
Scanlon, Denise	FANUC Robotics
Schultz, Tom	United Solar Ovonix
Shallman, John	Beaumont Commercialization Center
Shilling, Glen	Detroit Country Day School
Siebert, Laurie	Walsh College
Smereka, Corinne	Society of Automotive Engineers.
Staudacher, Thom	Ajlsoft Inc.
Swanger, Alice	DELMIA Corp
Spanos, Irene	Oakland County PEDS
Thibodeau, Wayne	Oakland University
Tribuzio, Christina	PKG Engineering Services
Vaz, Dr. Maria	Lawrence Technological University
Victor, Mary Ann	Somanetics
Williams, Gerald	Donor Dialogue

APPENDIX H: COMMUNICATION DEVICES

INTRODUCTORY LETTER SENT FROM JOHN ALMSTADT TO POTENTIAL STAKEHOLDERS -



L. BROOKS PATTERSON, OAKLAND COUNTY EXECUTIVE

EMPLOYMENT AND TRAINING DIVISION
John Almstadt, Manager

Dear Stakeholder:

We are looking for your assistance in an important project now underway in Oakland County. This project will benefit you and your organization in the foreseeable future.

In 2007, the Workforce and Education Committee of the Oakland County Business Roundtable recommended that the County Executive and the Oakland County Workforce Development Board oversee the development and implementation of a **Skills Needs Assessment Checklist (SNAC)**. The Checklist will target current and future Oakland County Emerging Sector employers as identified by the County. Once designed, the Checklist will gather information from employers to provide workforce developers and educators with a better understanding of the skills/competencies job seekers need to qualify for emerging sector jobs.

As a selected stakeholder that represents the employer, workforce development, or education community, you are asked to devote 5 to 10 hours over a 4 to 7 month period to assist in this important effort. You will simply provide input during the design, validation and implementation phases of the project. Aside from the initial design phase discussed below, most of the input will be gathered through the use of on-line discussion forums and email responses. The initial phase would require a half day of your time and attendance to assist in the design and/or validation of the Checklist.

EdEn Inc., an Oakland County entity, has been selected to manage this initiative. EdEn will be conducting two half-day group work team collaborative sessions to gather stakeholder feedback and drive consensus on the Checklist's content and usability. These sessions will be held at the OU Incubator Collaboratory on the campus of Oakland University. The overall success of this project will depend greatly upon the participation of people like you in one of the short sessions.

Your participation will then continue "on line" by providing subsequent feedback on the preliminary Skills Needs Assessment Checklist as it is developed. A member of the EdEn project team will be contacting you shortly to verify your participation and provide specific details on the next steps involved, including possible dates for your collaboratory session.

OAKLAND COUNTY EMPLOYMENT AND TRAINING
1200 N TELEGRAPH RD DEPT 437
PONTIAC MI 48341-0437
(248) 858-5520 • FAX (248) 452-2260

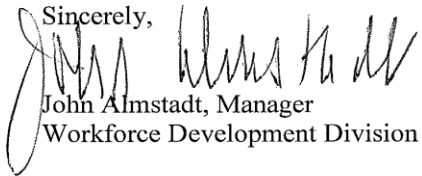
Auxiliary Aids and Services are Available Upon Request to Individuals with Disabilities.
Oakland County's Telephone Number for the Deaf and Deafened is (248) 858-4087

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EQUAL OPPORTUNITY PROGRAM/EMPLOYER

Page 2

As a key stakeholder in Oakland County job development, your participation is critical to the overall success of this project, and I appreciate your willingness to assist. If you have any questions in the meantime, please contact Dawn Campbell at (248) 640-4690.

Sincerely,

A handwritten signature in black ink, appearing to read "John Almstadt".

John Almstadt, Manager
Workforce Development Division

INTRODUCTORY LETTER SENT FROM L. BROOKS PATTERSON TO EMERGING SECTOR EMPLOYERS -



L. BROOKS PATTERSON, OAKLAND COUNTY EXECUTIVE

C O U N T Y M I C H I G A N

June 20, 2008

Dear Oakland County Emerging Sector Employer:

I am requesting your critical input for an important new initiative that is underway in Oakland County. This exciting project should help you maintain a competitive advantage through your most important resource – your employees.

Last year, the Workforce and Education Committee of my Oakland County Business Roundtable recommended that the Oakland County Workforce Development Board develop and implement a **Skills Needs Assessment Checklist**, which will function as a strategic tool within our **Emerging Sectors Program®**.

As you know, the Emerging Sectors Program is our long range global initiative to ensure that Oakland County thrives as a premier technology hub. One of our key strategies to attract and retain leading edge technology companies is to maintain a highly skilled workforce. The competence of this workforce will depend on the extent to which the county's workforce developers and educators can anticipate the knowledge, skills and abilities your employees need to meet current and future demands.

The **Skills Needs Assessment Checklist** will be based on independent research and on input from a cross section of Oakland County stakeholders. Emerging Sector employers will then validate the Checklist to ensure that the skills and competencies associated with key sector jobs are identified and communicated. We believe this will increase the number of qualified employees in our county. In addition, the Checklist will identify the skills and competencies our students need to qualify for available internship opportunities.

John Almstadt, the Manager of our Workforce Development Division, will oversee the project, and we have contracted with one of our Oakland County consulting firms, EdEn Incorporated, to research, design and implement the **Skills Needs Assessment Checklist**. Our team has targeted you as an ideal candidate to complete the Checklist during the implementation phase of the project. You will be contacted by someone from EdEn about your assistance in this effort. If you have questions or comments in the mean time, please contact Mr. Almstadt at (248) 452-2256.

Thank you in advance for your participation. You will help us attract, train and retain a highly skilled employee base within Oakland County.

Sincerely,

L. Brooks Patterson
Oakland County Executive

Oakland County



Dear Survey Participant:

QUICK LINKS

[L. Brooks Patterson Letter](#)

[Oakland County Skills
Needs Assessment Home
Page](#)

[Oakland County Michigan
Home Page](#)

[Oakland County Emerging
Sectors](#)

[Sample Profile](#)

Survey Link:

We would appreciate if you would take the time to complete the



survey by clicking on:

www.skills-oaklandcounty.com/survey

If you would like more information on the program prior to completing the survey, go to the Oakland County Skills Needs Assessment Program website (www.skills-oaklandcounty.com) and, when ready, click on "Take the Survey."

We ask that you complete the survey no later than **October 15**.

Survey Log-in:

Your personalized log-on information is as follows:

Username: Your email address
Password: Oakland

If you are unable to complete the survey in one sitting, the system will enable you to resume at the point where you left off.

If you have questions, or run into difficulty while taking the survey, please contact us by clicking on the "CONTACT US" tab on the website or by phone at 248.648.4690. Thank you again for your participation.

Sincerely,

Skills Needs Assessment Project Team
John Almstadt, Project Director for Oakland County

EdEn, Inc | 2200 N. Squirrel Road, OU INCubator | Rochester | MI | 48309

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