Oakland Community College

Curriculum Review

Reports Supporting the Review of the Computer Hardware Engineering Technology Program

Prepared by the Office of Assessment & Effectiveness
February 2006

OAKLAND
COMMUNITY
COLLEGE

Gail Mays

OAKLAND COMMUNITY COLLEGE

COLLEGE CURRICULUM REVIEW COMMITTEE

WELCOME TO THE CURRICULUM REVIEW SELF-STUDY PROCESS

Discipline/Program CHT Coordinator(s) Dr. Robert A. Powell

CRC Mentor Gail Mays Review Date: March 17, 2006

Thank you for agreeing to coordinate the Curriculum Review in your area. As Discipline/Program Review Coordinator, it is your responsibility to make sure the steps detailed below are completed by the Review Date. Your packet includes instructions and forms for completing the Review. If needed, a CRC mentor is available to you. Your Dean will also be able to provide meaningful assistance in completing this important task.

In the Part I-Core Review, the College asks your discipline/program to analyze its curriculum from a variety of perspectives. These include course offerings and contents, enrollment/retention, transfer trends, and plans for the future. An additional section of activities is contained in Part II. The nature of these review activities will depend on whether you are a member of a Discipline or a Program.

Included in this document to help you work on your review are: 1) Data Collection forms to distribute to your Discipline/Program colleagues and 2) Data Analysis forms with summary sections to help you complete your review. After filling out these forms, you will finalize your review by re-printing all of the summary sections on one Summary Report Form for submission.

Once again, thank you for agreeing to work on this very important process with your colleagues. Together we will constantly strive to ensure the excellence of instruction at OCC.

College Curriculum Review Membership
2005-2006

Lin Armitage (HL)
Thomas Boozer (AH)
Nadia Boulos (HL)
Charlott Couch (RO/SF)
Jennifer Craft (AH)
Diane Hill (OR)
Tony Ingram (OR)
Shelley Larson (RO/SF)
David Mathews (RO/SF)
Gail Mays (AH)-Chair
Janet Peart (AH)
Letyna Roberts (ex-officio)
Karen Robinson (HL)
Beverly Stanbrough (RO/SF)
Bob Zemke (OR)

CORE REVIEW
A. COURSE CATALOG DESCRIPTION

Coordinator: Complete this form after reviewing the Course Catalog Data Collection forms from members of your Discipline/Program on all of the courses listed in the Catalog.

List every course that is listed in the catalog. Check where revision is indicated or no revisions seem necessary. Please, add lines where needed.

	Revision needed	No Revision necessary
Course Number EEC1020	___	✓
Course Number EEC1040	___	✓
Course Number EEC1050	___	✓
Course Number EEC1270	___	✓
Course Number EEC1350	___	✓
Course Number ELT2070	✓ — This course is going to be purged fast 2006 Fall	___
Course Number ECT2080	___	✓
Course Number ECT2150	___	✓
Course Number ECT 2160	___	✓
Course Number_____	___	___

COURSE CATALOG DESCRIPTION REVIEW SUMMARY:

Catalog Desemptions for all courses are accurate, clear, appropriate and current. description
One course however - EELT 2070 - needs a minor change i.e. from "..... implemented with basic logic elements such as flip flop latches and gate which are fundamental to logic systems" - TO - "implemented with microcontrollers which are now fundamental to logic systems". OK

CORE REVIEW
B. SYLLABUS REVIEW, CONTINUED

***Coordinator:** After reviewing the Data Analysis forms on all the courses in the Discipline/Program, please summarize your analysis of whether or not there are course syllabi in your Discipline/Program that need revision due to inconsistencies or omissions, or other issues.*

SYLLABUS REVIEW SUMMARY:

All syllabi for all courses are accurate, clean, current & appropriate [illegible]

OAKLAND COMMUNITY COLLEGE

TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Staff Development re: Electronics (ELE) & CHT Programs - Discipline of One
DATE: January 18, 2001/Revised 3/17/2006

Staff development activities organized for full-time and adjunct faculty

- Taken as a general statement, these activities are on record as those provided by PDTC.
  Powell: Please see attached memo dated April 20, 2001 from Mary Ston
  Fonda: Attended PDTC Saturday Event for Adjunct - Fall 01'. Please see Data Collection Documents

Additional Staff development needs

- PDTC offerings adequate at this time

Career field continuing education

- Field requires continuing education.
  Powell: Please see attached memo dated January 25, 2001. This activity for Discipline Specific Training relative to Electronics Simulation Software was approved and training was completed February 2, 2001 in Orlando, FLA. : Please see attached memo dated April 20, 2001 from Mary Ston regarding tutoring activities to sit for the Society of Manufacturing Engineers (SME) CmfgT exam which I passed Fall 01'.
- Certificate of Completion - IGRIP Basic Training Course (Interactive Graphics Robot Instruction Program)
- Certification Administrator - International Society of Certified Electronics Technicians (ISCET)
- Certified Electronics Technician (ISCET) #MI369
- Certified Manufacturing Technologies (CMfgT) - Society of Manufacturing Engineers (SME)
- Certified Cisco Networking Instructor (CCNI)

OAKLAND
COMMUNITY
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TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Student Recruitment for EEC Core Courses, ELT & ECT courses, and ELE & CHT Programs
DATE: January 18, 2001

STUDENT RECRUITMENT - Recent

- Certification Administrator (CA) for International Society for Certified Electronics Technicians (ISCET)
- Course Equivalency Agreements with Ferris State University, Lawrence Technological University, Wayne State University (see attached)
- Technology Presenter - "2001 A CAREER ODYSSEY" . Oakland Technical Center, Northwest Campus, February 6, 2001. Included Power Point Presentation and handouts. I was later quoted in a Detroit News article dated March 4, 2001 relative to the event. (please see attached)
- Administered the American Technical Education Association Great Lakes Region Conference held at the Hilton Suites, Auburn Hills, along with the Auburn Hills Campus. This conference was co-sponsored by Oakland Schools and the Design and Manufacturing Alliance (DMA)
- Exhibited at the Open House activity for the Applied and Engineering Technologies. Targeted toward High School and Oakland Technical Centers students. Parents were also invited (November, 2000)
- Tech Check 2000 - Focus on Middle and High School Students but open to all (April, 2000)
- Quoted in the Detroit News, October 15, 2000 for "Employers Quickly Hire Circuit Board Assemblers" (please see attached)
- Applied & Engineering Technologies newsletter dated Fall, 2001. Described "On the fast track - Dr. Bob hard wires his curriculum" (please see attached)
- Personally, I have found "word of mouth" by students to be one of the best means of INDIRECT RECRUITMENT

STUDENT RECRUITMENT - Future

- "Careers in Technologies" - Informational session for High School Seniors (April 4, 2002)
- Technologies Career Breakfast for Counselors (March 6, 2002)
- Oakland Technical Center - Northwest Campus; 2002 Odyssey - Electronics presentation to OTC students and parents with respect to advanced placement, career awareness and certification (February 6, 2002)

CORE REVIEW
C. ENROLLMENT TRENDS AND STUDENT RETENTION

Coordinator: The Dashboard report on your Discipline/Program will collect the necessary data in regard to Enrollment Trends and Student Retention. Use this form to review that data in the following areas:

Enrollment (Use the Dashboard data on Average Section Size, Sections Filled to Capacity, Percent of Completed Sections, Percent Change in Headcount, and Percent Change in Credit Hours to discuss this area.)

39 Associate Degrees + 15 Certificates have been awarded over the 10 years of which the majority have been awarded over the past 4 years. ECT courses in steady decline over past 10 years. + credit hours have fallen by 72% Since 2004. 5 ECT sections offered — none cancel Average class size = 19.5 c's slight below college AVE.

↓ in credit hours

Minority Students (Use the Dashboard data on Minority Students to discuss this area.)

Slightly above the college-wide average

Student and Course Success (Use the Dashboard data on Percent of Withdrawals, Percent of Incompletes, and Student Course Completion Rate to discuss this area.)

Both the percent of students who withdraw and receive incompletes are below the college-wide average. 86% of all students successfully pass ECT course w/ a grade of "C" or better which is above the college wide average of 65%

when completed write grade % of C or better

ENROLLMENT TRENDS AND STUDENT RETENTION REVIEW SUMMARY:

Although student credit hours in ECT courses have steadily declined over the past 10 years, the ECT sections offered have not been cancelled and students complete an ECT course with a "C" or better grade.

↓ but sections offered of w/ 20 students and 86% pass w/ C

CORE REVIEW
D. DISCIPLINE/PROGRAM NEEDS AND RESOURCES

Coordinator: Please summarize the needs, resources, and curriculum actions indicated on the Data Collection forms.

What resources or services does your Discipline/Program need?

(1) The college needs a consistent and appropriate marketing plan for all courses, programs and services. A common awareness in the OCC community is that a significant number of Oakland Lou residents lack an understanding of where OCC is or that OCC even exists

how will this help CHT?

What curriculum revisions or development does your Discipline/Program see as beneficial to instruction?

Appropriate changes have already been made to include ECT courses with CIS courses with respected to Homeland Security. Future CA's will be created to offer course sequence in CIS + CHT to allow for a technician skilled in

does CHT need to merge w/ CIS? shift a market could be specialization under CIS?

DISCIPLINE/PROGRAM NEEDS AND RESOURCES REVIEW SUMMARY:

programming, networking, A+ + Net+, CISCO

E. INPUT FROM INTERNAL & EXTERNAL COMMUNITY

Coordinator: After reviewing the Data Collection forms on all the courses in the Discipline/Program, along with the collated data summary, please analyze and summarize these findings.

Faculty Perceptions of Occupational Programs and Disciplines Analysis

By & large the perception of faculty is most satisfactory with a majority of "Agrees"

Student Perception of Occupational Programs and Disciplines Analysis

Please see

Advisory Committee/Industry Perceptions of Occupational Programs/Disciplines Analysis

Please see attached Advisory Committee minute

INPUT FROM THE INTERNAL AND EXTERNAL COMMUNITY REVIEW SUMMARY

Please see attached

OAKLAND
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TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Input from the internal and external committee for EEC Core Courses, ELT courses, and the ELE Program
DATE: January 18, 2001

INTERNAL COMMUNITY (please see attached for all that is listed below)

- Oakland Community College Board Digest dated November 20, 2000 - "He [student Andrew Lauman] also praised his instructor, Dr. Robert Powell, the up-to-date instructional technology, the . . . "
- Sample thank you letters from students
- Thank you Certificate of Appreciation from Willie L. Lloyd for a presentation by me on the Third Annual co-op Day, February 6, 1997.
- Thank you letter from scholarship recipient Amy A. McGuckin
- Letter of congratulations from Cheryl A. Kozell, Workforce/Resource Development (August, 1998) for being chosen an outstanding instructor the General Motors Technical Education Program for Winter 1998.
- Thank you from AH Counseling Department for speaking at their in-service activity in February, 2000. The topic was "Use of Technology in the classroom"

FACULTY PERCEPTIONS OF OCCUPATIONAL EDUCATION PROGRAMS

- By and large, the perceptions are favorable in all areas except for those areas related to placement services, career planning, job related opportunities, student recruitment and program marketing
- Instructional support, laboratory facilities, equipment and materials get the highest scores

EXTERNAL COMMUNITY (please see attached for all that is listed below)

- ADVISORY COMMITTEE: Highlights of the minutes were as follows:
  - While faculty have been reviewing programs, searching for alternative delivery methods, such as flexible scheduling and fast-track offers, coursework quality remains a high concern with these methods
  - When attending full-time, the current recommended sequencing of courses for the students in the counseling guides are intended to show the fastest schedule from the beginning until graduation
  - One committee member inquired about the fast-track options. An OCC faculty said that these sections and classes are quite successful
  - Articulation agreements exist between High Schools Southfield, and Troy. The committee was in total support of the effort. These efforts were the work of Professor Willard Rush who has since retired. Dr. Sharon Blackman has the documentation.

EXTERNAL COMMUNITY (continued)

- The committee identified five top jobs created from the last meeting which are: Fire Alarm Technician, Automotive Diagnostic Technician, Electronic Technician, Medical Technician, and Telecommunication Installers. It was pointed out that Customer Service Skills were very important to job success.
- Teaching the basics of electronics has always served as the philosophy of the ADVISORY COMMITTEE members

- TRENDS IN TECHNOLOGY

  - Computer technology in vehicles (Onstar)
  - Locating places when driving (restaurants or gas stations, etc.).
  - Data collection for traffic control
  - Road designing by instrumentation
  - More economical to purchase new equipment instead of repairing damaged ones
  - Computers networked together without wiring
  - People working at home on the computer, flying in an airplane, driving in the car, and at work will all be networked
  - NATIONAL SKILL STANDARDS - For all my classes I have adopted COURSE CONTENT GOALS that comply with the Electronic Industries Association and Electronic Industries Foundation Occupational Skill Standards - Washington, DC: October 1995.

- General Motors letters of commendation for 1998 and 1999 regarding superior teaching performance (GM language no mine).
- Letter to the Chancellor from Mr. Robert Stephen Campbell, Department of English, Wayne County Community College on behalf of my instructional methodologies
- Thank you letter from FIDIA Corporation in which I invited them to present their company attributes to my classes

- STUDENT PERCEPTIONS OF OCCUPATIONAL EDUCATION PROGRAMS

  - Data clearly indicates that students are unaware of:
    1. Placement Services
    2. Career Planning
    3. Job Related Opportunities
    4. High scores on Instructional Support, laboratory facilities, equipment and materials and instructor knowledge

COMPUTER HARDWARE TECHNOLOGY & ELECTRONICS TECHNOLOGY ADVISORY COMMITTEE MEETING

February 15, 2001

ELT Members Present:	Cindy Ball, Daniel Bednarski, Michael Bednarski , Richard Collins, Rudy Latzko
CHT Members Present:	Gerald Clute, Robert Colenso, Richard Collins, Gary Groce, Andrew Hartsig
OCC Members Present:	Dr. Sharon L. Blackman, Willard Rush, Rhonda Gaines, Marikay Clancy, Mike Clancy, Carole Baier

Welcome and Review of Minutes

Dr. Sharon Blackman opened the meeting by introducing herself and invited the group to introduce themselves. The minutes of the Computer Hardware Technology Advisory Committee meeting held on March 16, 2000 were reviewed and approved. The minutes of the Electronics Technology Advisory Committee meeting held on February 23, 2000 were approved with the correction that William Robinson sat in for Gary Groce at the last meeting.

Program Update

Enrollment trends

Enrollment trends reports were passed out to the committee. Dr. Blackman took the committee through a review of enrollments in Computer Hardware Technology (CHT), Electronics Technology (ELT), and Electrical Trades for the past three years. The reports showed the enrollments with breakdowns between day and evening classes, which made clear that the enrollments were very heavy in evening. Dr. Blackman also explained about cancelled and piggyback classes.

Degree trends

Dr. Blackman explained the number of degrees and certificates, in both the Electronics and Computer Hardware Programs. Mr. Rush described how students come to OCC, take a couple of CHT classes and get a job in repair, then later return to school for further study.

Counseling Guides

The department has put together a counseling guide for the Electronics and Computer Hardware areas. Dr. Blackman stated that it takes an average of seven years for technology students to complete a degree because the majority of these students are enrolled part-time. Faculty has been reviewing programs, searching for alternative delivery methods, such as flexible scheduling and fast-track offerings. However, coursework quality remains a high concern with these methods.

Dr. Blackman informed the committee that as advisory members, one of the challenges is to ensure that we are maintaining the quality of our programs, and assist us in being forward thinking so that when there are new trends up the road, OCC can include that information in the curriculum. Advisory members also provide advice as to the types of equipment and resources necessary for the programs. When attending full-time, the current recommended sequencing for the students in the counseling guides are intended to show the fastest schedule from the beginning until graduation.

Dr. Blackman asked if there were any questions, and Mr. Richard Collins really liked the fast-track options. Mr. Rush said that Dr. Powell has been tracking these sections and the classes are quite successful.

Report on High School Articulations

Mr. Bill Rush informed the group that there are now articulation agreements between OCC and Southfield, Troy, and Clarkston schools. Copies of the agreements were passed out to the committee for review. OCC and the high schools make an agreement whereby OCC will give credit for what the high school is teaching in electronics towards OCC's Electronics Programs. The content of the courses are reviewed by OCC. Dr. Blackman explained how the articulation agreements work, including how the requirements by OCC form the school's classes. The agreements between OCC and the high schools are good for two years, and are evaluated before approval. Dual credit will also be discussed with each school system. The committee thought that high school articulation agreements with OCC were an excellent idea.

Electronics & Computer Hardware Technology Career Opportunities

Identify top five jobs from list created last meeting

Computer Hardware
- Basic PC Technician
- Hardware and Software Support Technician
- Network Support Technician
- DOS/NT PC Technician
- Software Troubleshooting

ELECTRONICS
- Fire Alarm Technician
- Automotive Diagnostic Technician
- Electronic Technician
- Medical Technician
- Telecommunication Installers

Customer service skills were also mentioned in both areas.

Is the program preparing students for those jobs?

Computer Hardware.

Mr. Andrew Hartsig commented that the CHT classes went into great depth about how the computer functions on the mechanical troubleshooting side, but are missing the software part of the computer. If OCC could incorporate a networking class in the program, many people would take the class. Network Technician and Network Administrator jobs are in high demand and with a very high salary.

The committee's opinion was that it was a possibility that students take some kind of CIS type class in networking, but related to the programs. Ms. Rhonda Gaines commented that CIS 163 had a course description stating that CIS 105 or experience equivalent to CIS 105 was needed before entering the class.

Dr. Blackman stated that OCC might have to come back to the committee to identify a class. Dr. Blackman stated that she and Mr. Rush had been talking about getting together with the CIS discipline regarding some of these issues. Since there is some overlap between these disciplines and both CHT and CIS people need to work on this area, possibly a new course will be developed.

Electronics

There was discussion regarding DDT 100 in the program, and whether that class will meet the needs of the students, since that class is not done on the computer. Dr. Blackman told the committee that OCC has articulation agreements with many high schools to give credit for DDT 100 and CAD 110. The committee also discussed alternative delivery methods, such as flex scheduling (7 1/2 week format), for the DDT 100 and DDT 114 course.

Trends in Technology

Computer technology in vehicles (Onstar)
Locating places when driving (restaurants or gas stations, etc.).
Data collection for traffic control
Road designing by instrumentation
More economical to purchase new equipment instead of repairing the damaged equipment
Computers networked together without wiring
People working at home on the computer, flying in an airplane, driving in the car, and at work will all be networked.

Closing

Dr. Blackman thanked the group for their service as members of the advisory committee. The new members were presented with a small gift.

Respectfully submitted,

Carole Baier

OAKLAND
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COMPUTER HARDWARE ENGINEERING TECHNOLOGY

ADVISORY COMMITTEE MEETING

March 18, 1999

Members Present:

Daniel C. Bednarski, Road Commission of Oakland County
John P. Brooks, N.I.C.E. Inc.
Richard T. Collins, Oakland Technical Center - Northeast Campus
Gary Groce, General Motors
Barry Jocque, OCC Computer Hardware Student
Raymond J. Williams, DaimlerChrysler Corporation

OCC Ex Officio Members Present:

Sharon L. Blackman, Ed.D., Dean of Technology
Patrick Dean, Paraprofessional
Sally Kalson, Coordinator of Cooperative Education
Verna M. Love, Counselor
Dr. Robert Powell, Faculty
Willard Rush, Faculty
Ruth Springer, Secretary

Welcome and Review of Minutes

Dr. Sharon Blackman, OCC's new Dean of Technology, introduced herself and welcomed the group. She invited the members to introduce themselves.

The minutes of the Computer Hardware Engineering Technology Advisory Committee meeting held on October 30, 1997, were reviewed and approved as submitted.

Dr. Blackman invited the group to review the minutes of the follow-up meeting of OCC staff which was held on February 19, 1998. She asked the members to comment on any items which they felt needed to be discussed.

Printed on Recycled Paper with Soy Ink

1. **That the College consider setting up an intranet which could be accessed by Computer Hardware students to obtain information and do assigned exercises from home if they wished.**

The group asked whether this recommendation had been completed, and Mr. Patrick Dean responded that it had.

Mr. Willard Rush reported that he is doing something new this semester. He has his own web site which students can access to take quizzes and submit lab assignments. About 20 percent of the students have taken advantage of this thus far. He believes the experiment has been successful enough to continue in the future.

The group asked whether this is done on the honor system, assuming that students are actually doing their own work and turning it in via the Internet. Mr. Rush agreed that there is a slim possibility that someone else could log on under a student's e-mail address and do the assignment for them. Mr. Rush still does testing on campus.

The group asked about recommendation 6 from the Electronics Advisory Committee minutes which was discussed at the last joint advisory committee meeting:

6. **That the College explore the possibility of including a co-op internship as part of the Electronics Technology curriculum.**

Dr. Robert Powell responded that a co-op class, ECT 170, already exists. It has been offered twice in the past, and no one registered for it. However, the course still exists, and could be used if a student was interested in a co-op experience. It could be activated and attached to another course as an independent study class. The faculty do not feel it is necessary to go through the curriculum process to formally make ECT 170 a part of the Electronics Technology curriculum.

Proposed Curriculum Revision

Copies of a proposed curriculum revision were distributed to the group (see attachment). Dr Blackman explained that the first page shows the current Computer Hardware Engineering Technology curriculum in a sequence that a student could follow to complete the program in two years. The second page shows the revised curriculum which is being proposed. It is being proposed that one credit hour be added to each of the following courses: EEC 102, DC Fundamentals; EEC 104, AC Fundamentals; EEC 105, DC and AC - Circuit Analysis; EEC 127, Basic Electronics; and EEC 135, Digital Logic. Each of these three-credit courses would become four-credit courses. Each of the five courses would have 60 contact hours.

Dr. Blackman explained that she feels it is important to present our curricula in this type of format so students can see how they could complete all their associate degree requirements, including general education courses, within two years if they were able to attend school full-time. She pointed out that ENG 151, Composition I, has been included in the first semester of study. This is to help students get the foundational English skills they will need to be successful in their other classes. OCC students take an average of five to eight years to complete a two-year associate degree program. Students often take their technical courses but not the general education requirements. Then employers tell us their employees don't have the skills they need in such things as communication, problem solving, and teamwork. We know that our students often take a few courses and then stop out. They may work awhile and then come back later to take a few more courses. Many take the technical courses they feel they need but never complete their associate degree. One of the criteria used to evaluate institutional effectiveness is how many students are completing our programs and graduating. The graduation rate for Technology Department programs in general has not been good. Dr. Blackman has asked the faculty to look at their programs to determine whether there are natural stop-out points where students might take a few classes and earn a certificate, then come back to earn another certificate, which would serve as building blocks to achieve the associate degree.

Dr. Blackman asked the group to consider and discuss the following questions: Who are the products of this program? What are we preparing students to do? Are there different levels of skills necessary for various types and levels of work? How can we increase enrollment and increase the number of program completers? We need to think about the competencies for each class and consider whether we are providing the instruction students need in each course. We also need the advisory committee to advise us about the future in this industry and what skills students will need to be employed in the future.

Mr. John Brooks responded that all the advisory committee members represent just a tiny portion of this industry. It is tremendously diverse, and what one branch needs may be the opposite of what another needs. He believes OCC should train students on the basics and then let them become specialized on the particular job they acquire. We need to concentrate on the core electronics curriculum, AC and DC, and then teaching such things as computer repair and microprocessor technology. He believes the curriculum is pretty well structured the way it is now, including a solid core of instructional areas which will be needed by everyone going into the field. If students have a basic understanding of electronics, they should be able to get a job and then move up within the company and become specialized in the particular industry where they are working.

Dr. Blackman pointed out that enrollment is declining in this program and in many of our Technology programs. She asked the group for their ideas on how to attract students to the program.

The group pointed out that the industry is growing fast now and hiring people with less skills. That is why enrollment is down. It was suggested that perhaps a certificate could be offered that included just the electronics core courses. This would document for employers that students have some understanding of electronics. Then they could take the rest of the courses later, perhaps even paid for by the employer. Students each have their own individual goals in taking classes. Some may already be employed and be taking classes to improve their skills. Students just out of high school may take two years at OCC and then move on to a four-year institution. Students may seek employment in companies of varying size and type. We need to find out what these various types of companies expect of our students.

Mr. Barry Jocque commented that he believes part of the reason for the lower enrollment and lack of program graduates has to do with the current curriculum. He stated that he, personally, does not have the degree because he has had a problem with a couple of courses, in particular the Math requirements. He believes that Math requirements could be hindering other students from graduating or discouraging students from entering the program. Mr. Jocque has difficulty seeing the relationship between the MAT 156, Trigonometry, requirement and the work he is doing now with computers.

Dr. Powell agreed that only a small part of the contents of MAT 156 are applicable to the Computer Hardware Engineering Technology Program.

Dr. Blackman pointed out that, when employment is steady, we do not have as many students, so we need to look at other ways to increase enrollment. Also, when we have fewer dollars to work with, programs have to produce in order to get the funds that are available. We need to educate our own internal community to understand that there are at least three possible types of program completers: Marketable skills achievers; competency certificate recipients; and associate degree recipients. Those who receive a competency certificate have a document that shows employers what they can do. We can document those who receive a certificate or degree, because they have completed a specific program of study. It is much more difficult to document the marketable skills achievers as to why they came, who they are, and where they went. We need to find a way to document these students who take only a few classes to meet their personal goals, in order to show how we contribute to the economic development of our community.

Mr. Rush asked for input from the committee on the possibility of doing a trial run during the Fall term of offering some courses in 7 ½ weeks rather than the usual 15-week time frame. Students could take EEC 102 the first 7 ½ weeks by attending class two nights a week, and then take EEC 104 the second 7 ½ weeks. The same content would be covered as in the longer 15-week course. Several group members expressed their belief that this would be a good idea.

Mr. Brooks mentioned that students sometimes become discouraged when they are unable to continue with their prescribed sequence of courses because a prerequisite course was canceled when they needed to take it. Dr. Blackman responded that a packet is being put together for

counselors to use in advising students so they know when each course will be offered in sequence. If they know a particular course will only be offered once a year, they can plan accordingly.

Mr. Brooks suggested that the College offer a continuing education program covering current subject matter which would be of interest to people in the industry. Dr. Blackman agreed, stating that we would need to identify the kinds of courses that would be attractive to industry. We could offer non-credit courses that would allow people to see what we do and might encourage them to come back and take regular courses and possibly complete the degree.

Dr. Blackman called the group's attention to the proposed curriculum revision which had been distributed earlier in the meeting. Mr. Gary Groce asked whether the two-year course sequencing layout could be included in the College Catalog. He suggested that it would be easier for students to make their plans if they could see the progression of courses in the catalog. Dr. Blackman agreed that that would be a good idea.

Dr. Powell asked the group for their input regarding the two Drafting classes which have been included in the curriculum in the past: DDT 100, Fundamentals for the Drafting Industry, and DRT 114, Electronics Drafting. Dr. Powell stated that DRT 114 is only offered during the Spring/Summer term and always conflicts with some other required course. In the past when these courses were put into the curriculum, it was appropriate that they be included because more of our students were hoping to move up into management in the electronics field. However, this no longer seems to be the case. We are asking the committee to advise us as to the applicability of these two courses to this program. If they could be deleted, it would allow us to add one credit hour to the previously mentioned five EEC courses without increasing the total number of credit hours required for the associate degree.

Mr. Brooks agreed that this would be a good idea. If a person was interested in drafting, they could take those classes, but it would not be required of everyone. It would be good to have another credit hour added to the advanced EEC classes, which would allow time to cover more material.

Mr. Jocque stated that he learned a great deal in DRT 114 about circuit boards and the theory behind them. He felt it would be a shame to lose that instruction from the program. He asked whether that content could be included in the other Electronics classes if DRT 114 was deleted from the program.

Dr. Powell responded that they do not currently have time in the EEC courses to teach everything they would like to cover, and there is a need to add more time to those courses. He does not believe that today's students need to take DRT 114. They do get some drafting in the simulation package used in other Electronics courses. If more time was added to those courses, they would be able to use all the material in the simulation package. Dr. Powell does not believe students need the level of drafting taught in DRT 114.

Dr. Powell mentioned that he would also like to eliminate BUS 131, Principles of Supervision, from the Electronics Technology curriculum. He does not believe it is needed by today's students.

Mr. Ray Williams asked whether the Trigonometry class is really necessary for this program. Dr. Powell responded that, with the extra credit hour added to the Electronics courses, they would be able to teach the trigonometry which is needed by students in this program.

Dr. Blackman reported that OCC is in the process of designing a new Manufacturing Technology degree curriculum for the Manufacturing Technology Academy program being undertaken in conjunction with Oakland Schools and under the financial sponsorship of DaimlerChrysler. The team of faculty working on this project includes Math, English, and Physics instructors, as well as faculty from the Technology Department. The team is considering the possibility of integrating academics into technical courses. For example, students might be able to receive Math credit for the math content in an Electronics course. However, there is a whole mind set within the College that would need to change in order to do this.

Mr. Groce responded that that would be a good idea. The College Algebra and Trigonometry courses teach students to think in an abstract and theoretical manner. However, students in technical programs need an emphasis on application rather than theory.

Ms. Verna Love commented that, in the past, technical math courses were included in the Technology programs. However, those courses are not accepted for transfer to four-year institutions, so some curriculum developers have included the standard Math classes in their programs.

Dr. Blackman pointed out that the committee is saying we should take a look at the Math requirements. However, the College's general education requirements for an associate degree include a Math requirement, so we need to stay within those requirements. Dr. Powell responded that we could retain MAT 154, College Algebra, as a part of the curriculum to meet the general education requirement, but delete MAT156, Trigonometry.

At Dr. Powell's request, the group began to vote regarding the proposed curriculum changes.

Mr. Rick Collins made a motion that DDT 100, Fundamentals for the Drafting Industry, and DRT 114, Electronics Drafting, be deleted from the Computer Hardware Engineering Technology curriculum. The motion was seconded by Mr. Williams and approved by the group.

Mr. Brooks made a motion that one credit hour be added to EEC 102, DC Fundamentals, and EEC 104, AC Fundamentals, and that one credit hour and fifteen contact hours be added to EEC 105, DC and AC - Circuit Analysis, EEC 127, Basic Electronics, and EEC 135, Digital Logic.

Each of these five courses would then be four credits and sixty contact hours. Mr. Groce seconded the motion, and it was approved by the group.

Mr. Groce suggested that the group amend the first motion to make clear their intention that the content of DRT 114 which is relevant to this program be included in the appropriate Electronics courses. The group agreed that this was their intent, and there was discussion about the need for such an amendment. The group concluded that it would be clear from the meeting minutes that this was the intention of the recommendation to delete the Drafting courses.

Mr. Williams made a motion that MAT 156, Trigonometry, be deleted from the Computer Hardware Engineering Technology curriculum. Mr. Jocque seconded the motion, and it was approved by the group.

The group asked about the possibility of offering competency certificates which could be subsets of the complete program certificate. Ms. Love referred the group to the Business Information Systems curriculum on page 58 of the College Catalog. After taking four designated courses, students may apply to the discipline for a competency certificate. After taking several more designated courses, they may receive a certificate from the College. The competency certificate is given by the Business Information Systems discipline, not the College, and prepares students for an entry level position.

The group recommended that the College consider offering such competency certificates as part of the Computer Hardware Engineering Technology curriculum. Dr. Blackman and Dr. Powell responded that we would need to first identify the competencies for all courses and then consider what courses might be included in such a certificate and what it would prepare a student to do. OCC staff will need to look at this possibility and bring it back to the committee for their input at a later date.

Mr. Brooks mentioned again that he would like to see OCC pursue the possibility of offering non-credit courses covering new areas that would be of interest to those working in the field.

The group suggested that OCC consider offering courses via distance learning. Perhaps the computer courseware which Dr. Powell has developed could be put on the Internet with certain safeguards. Students might do the majority of their work via the Internet and come to campus to take the midterm and final. This would make it possible to include students who live farther away if they only needed to come to campus a few times to take tests.

Appreciation

Dr. Blackman thanked the group for their service as members of the advisory committee. She presented each member with a certificate of appreciation and a small gift.

Advisory Committee Recommendations

1. That OCC consider offering some Electronics/Computer Hardware Engineering courses on a trial basis during Fall 1999 in a 7 ½-week time frame, so students could take one course the first 7 ½ weeks and another the second 7 ½ weeks.

2. That the College consider offering a continuing education program of non-credit courses covering current subject matter which would be of interest to people in the industry.

3. That the College consider including in the College Catalog the two-year course sequencing layout of the Computer Hardware Engineering Technology Program.

4. That DDT 100, Fundamentals for the Drafting Industry, and DRT 114, Electronics Drafting, be deleted from the Computer Hardware Engineering Technology curriculum.

5. That one credit hour be added to EEC 102, DC Fundamentals, and EEC 104, AC Fundamentals, and that one credit hour and fifteen contact hours be added to EEC 105, DC and AC - Circuit Analysis, EEC 127, Basic Electronics, and EEC 135, Digital Logic. Each of these five courses would then be four credits and sixty contact hours.

6. That MAT 156, Trigonometry, be deleted from the Computer Hardware Engineering Technology curriculum.

7. That OCC consider offering competency certificates which could be subsets of the Computer Hardware Engineering Technology certificate and degree program. These could be competency certificates granted by the discipline, similar to the competency certificate offered by the Business Information Systems discipline.

8. That OCC consider offering Electronics/Computer Hardware Engineering courses via the Internet with students coming to campus only to take tests.

Respectfully submitted,

Ruth Springer

Ruth Springer

(advw99:ect031899.min)

F. COMPARABLE COURSES/PROGRAMS AND TRENDS

Coordinator: Please use the data from the Comparable Courses/Programs and Trends Data Collection form to answer the following questions:

1. How does your program serve transferring students? Please discuss.

Artic a/ Yes, Ferris, Lawrence, WSU + EMU for what degrees?

2. Are your articulation agreements current? Please discuss.

Yes LTU Fall 2005
FERR W 2006 pR

3. Discuss employment opportunities for students in both the current and future job market.

Please see attached

4. Discuss the changes that will be made in your program in response to current/future employer expectations and market trends.

In -so-called- ?

COMPARABLE COURSES/PROGRAMS AND TRANSFER REVIEW SUMMARY:

Please see attached

The Detroit News and Free Press

careerbuilder

SUNDAY, MARCH 5, 2006 | SECTION N

Computer systems design and related services

Why it's hot:

This is another industry burgeoning because of technology developments. Businesses often don't have internal resources to implement new technologies or satisfy their changing needs. There are 146,000 computer systems design and related services establishments that can meet the specialized needs of a company, whether it's setting up a secure Web site, establishing an online marketplace, managing an onsite data center or help-desk support.

Who it employs:

The majority of workers in this industry are computer professionals, including computer systems analysts, computer engineers and computer programmers. Other jobs this industry generates are in sales, administrative and clerical, customer service, accounting and maintenance and repair.

Internet services, data processing and other related services

Why it's hot:

Increased demand for residential and business land-line and wireless services, cable service, high-speed Internet connections, and software will fuel job growth among Internet service providers and data processing services.

Who it employs:

Computer software engineers, engineering technicians, computer programmers, line installers and preparers, customer service representatives, human resources, training managers, accountants and sales representatives

TAKING NOTES ON THE ECONOMY: OUTLOOK FOR MICHIGAN

Presentation for:

MSU Institute for Public Policy and Social Research
Luncheon Forum

April 22, 2004

Mitchell E. Bean, Director
House Fiscal Agency
Michigan House of Representatives

TAKING NOTES ON THE ECONOMY: OUTLOOK FOR MICHIGAN

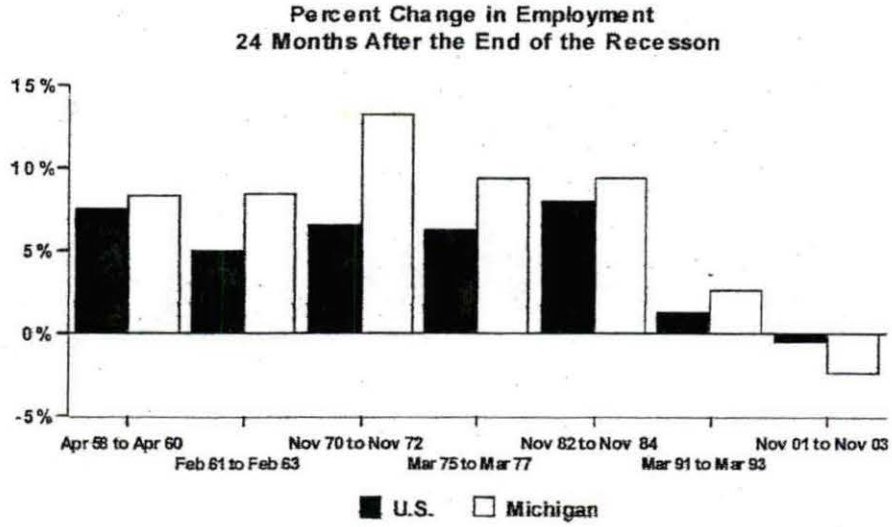
During the last three years the U.S. economy withstood a recession, terrorist attacks, numerous corporate scandals, and two ongoing wars. In many respects, the U.S. economy has demonstrated a great deal of resiliency.

The House Fiscal Agency is in the process of generating a forecast of the national economy, state economy, and state revenues that will be part of the Consensus Revenue Estimating Conference on May 18. Although the Agency forecast will not be finalized until just before the conference, I can share some generalities with you.

The national economy is improving, and the House Fiscal Agency expects the state economy to improve. But the job market in Michigan must improve first.

JOBS

The biggest negative for the national economy and the state economy has been the job market recovery—the slowest since WWII. In every other recovery, job growth was stronger and Michigan's job growth outpaced the nation. As shown in the graph below, that has not been the case this time.

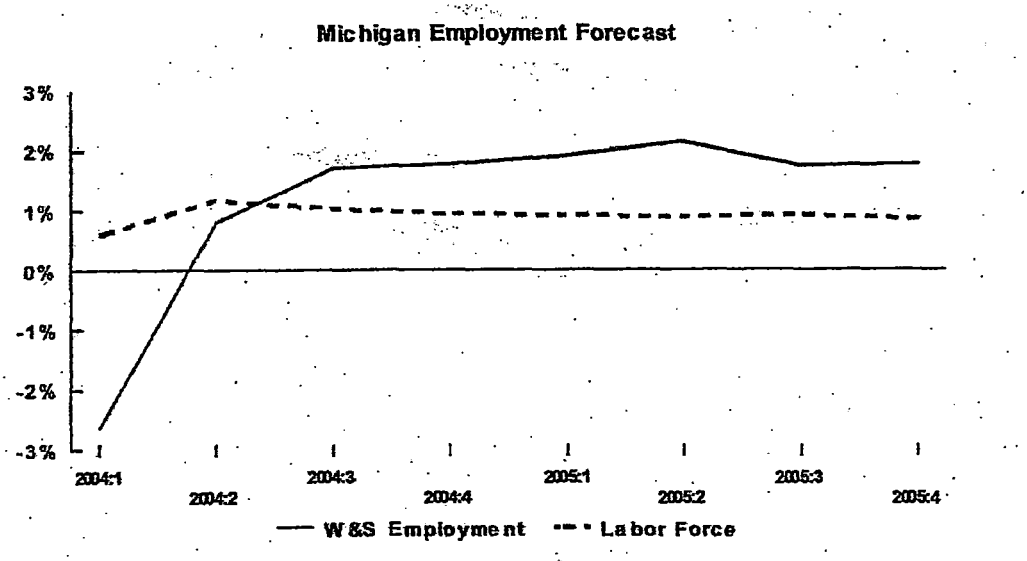


Despite modest gains last month, state employment in March 2004 was still 225,400 below state employment in March 2001. That includes 134,000 manufacturing jobs lost in three years—which represents 60 percent of total lost jobs.

Even though Michigan experienced job losses for the third consecutive year in 2003, there is positive news about the state job market: the rate of job loss now seems to be slowing.

In 2003, payroll employment fell by 70,000, but nearly half of all losses occurred in the first quarter of the year. By the end of the year, the quarterly job loss had slowed to 5,000. Available data indicated that job loss continued in the first quarter of 2004 and the state lost about 29,000 jobs—but this was less than half the rate of job loss in the first quarter of 2003.

The House Fiscal Agency expects the rate of job growth to turn positive in the second quarter of 2004. Job growth over the forecast horizon is reported in the following graph.



The U.S. economy and manufacturing, particularly the automobile industry, are the key drivers of state economic growth. Job losses in manufacturing continued in the first quarter of 2004, but the rate of job loss has slowed significantly.

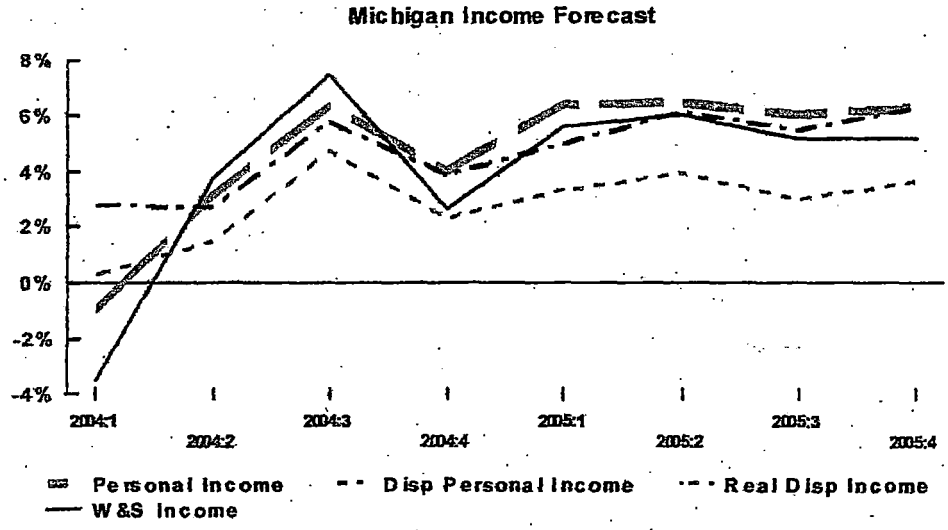
State job losses in the manufacturing sector averaged 12,000 jobs per quarter during the first half of 2003. By the fourth quarter of 2003, job losses slowed to 4,000, and fewer than 2,000 manufacturing jobs were lost in the first quarter of this year.

Another positive sign for the state economy is that the manufacturing workweek seems to be growing. For most of 2003, the average manufacturing workweek varied between 42 and 42½ hours. Since November 2003, the average workweek has increased to 43 hours. Increases in the average workweek are usually followed by increased hiring.

Improvement in manufacturing employment in Michigan in 2004 will be tempered by layoffs of autoworkers in Lansing and stamping workers in Grand Blanc, and by reductions in force at Delphi.

Expected gains in manufacturing employment in 2005 reflect, in part, the addition of a shift at the Lake Orion assembly plant and an increase in the payroll employment count attributable to the laid-off autoworkers in Lansing who shift into protected status programs.

Labor market gains lead to income gains. The House Fiscal Agency expects improvement in income growth over the forecast period as displayed in the next graph.



NATIONAL ECONOMIC OUTLOOK

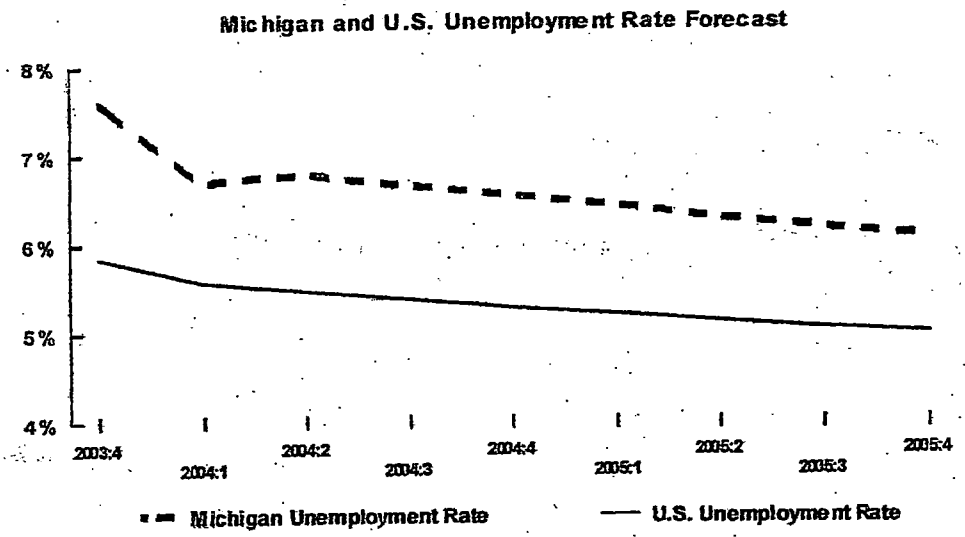
In the national economy, the House Fiscal Agency expects consumer demand, business capital spending, and inventories to contribute to real GDP growth of about 4.6 percent in the first half of 2004.

We expect output to slow somewhat in the second half of 2004 to something less than 4.0 percent. That rate of growth is maintained through the end of 2005 as consumer demand and government spending moderate.

The House Fiscal Agency expects the federal budget to remain expansionary through 2005—but less so than in recent years. Federal expenditures are projected to rise each year, but slow from growing 5.2 percent in FY 2004 to 4.1 percent in FY 2005. Federal receipts are expected to increase only 1.4 percent this year.

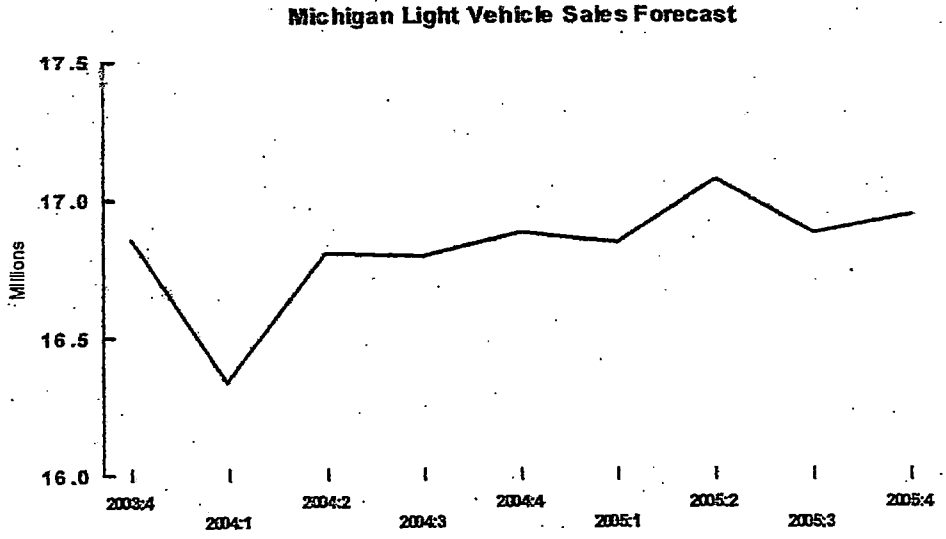
We expect the Federal Reserve to raise the federal funds rate by about 50 basis points this summer, followed by an additional increase of about 25 basis points after the election. We also expect increases of 150 to 175 basis points in 2005.
Increases in the federal funds rate lead to increases in the 3-month Treasury bill rate, which hits about 3 percent by the end of 2005. The 30-year mortgage rate is also expected to increase—to about 5.8 percent in late 2004 and 6.0 percent in late 2005.

As demonstrated in the following graph, U.S. unemployment rates are expected to improve.



The House Fiscal Agency expects modest increases in inflation in 2005.

Light vehicle sales are expected to average 16.7 to 16.9 million units in 2004 and 2005. The exchange value of the dollar is expected to decline somewhat, which slows the loss in the domestic share of light vehicle sales.



We also expect a growing world economy and a relatively weak dollar to stimulate the U.S. market for exports.

OTHER STATES

The recession and an extremely weak recovery in the job market have had a negative impact on state budgets around the country. Fred Giertz, an economist at the Institute of Government and Public affairs, UI Urbana, and Seth Gierth, CBO, analyzed national and state level data for all the states. Their findings are published in the March 2004 National Tax Journal. One of their conclusions was that ". . . states were indeed hit with an unprecedented downturn in revenues—unlike anything that had been experienced in the preceding half century."

These findings are consistent with recent NCSL reports on state revenues and should not be surprising. State revenues are directly impacted by job growth, which has also been weaker in the current recovery.

RISKS

The labor market in Michigan is showing some improvement, but has not yet recovered. If the state labor market does not improve as predicted, the state budget will still be under pressure.

The U.S. economy could be negatively affected by external factors completely beyond the ability of forecasters to predict—such as terrorism or the impact of additional corporate scandals on the equity markets.

STATE BUDGET ISSUES

In recent years, state revenue growth has been particularly weak—and at times negative—while spending pressures have increased. One of the most significant budget problems facing the states is funding Medicaid.

In Michigan, Medicaid is a $7.1 billion program. About 25 percent of General Fund/General Purpose and tens of millions in state restricted revenue are appropriated for Medicaid this year. In four years, Medicaid caseload increased over 27 percent and costs increased over 40 percent. As of December 2003:

- One in eight Michigan residents are receiving Medicaid
- Over one-third of births are paid for by Medicaid
- Over 70 percent of nursing home costs are financed through Medicaid

As we move forward, the biggest risks for the national economy are unpredictable external shocks. The health of the state economy is predicated on the health of the U.S. economy and improvement in the state job market. Barring unpredictable external shocks, we expect the U.S. economy to continue to expand and the state economy to expand this year, but continue to lag the U.S.

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Occupation Report

Occupation: Central Office and PBX Installers and Repairers
State: Michigan
Typical Educational Level: Post-Secondary vocational training

Description: Test, analyze, and repair telephone or telegraph circuits and equipment at a central office location using test meters and hand tools. Analyze and repair defects in communications equipment on customers' premises using circuit diagrams, polarity probes, meters, and a telephone test set. May install equipment.

Wages and Trends:

Central Office and PBX Installers and Repairers

Wages:

Location	Median, 1998		Midrange, 1998	
	hourly	annual	hourly	annual
United States	$21.00	$43,700	$18.09 -	$37,600 -
Michigan	$20.84	$43,300	$19.45 -	$40,500 -

How to interpret wage data

Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey; Michigan Department of Career Development

Rank this occupation across all states by median wage.

Trends:

Location	Employment		Percent change	Average annual job openings (due to growth and net
	1998	2008		
United States	44,400	58,800	32%	2,880
Michigan	1,700	1,950	16%	80

How to interpret trends

Source: Bureau of Labor Statistics, Office of Employment Projections; Michigan Department of Career Development

Rank this occupation across all states by percent change.

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Occupation Report

Occupation: Electronics Repairers, Commercial and Industrial Equipment
State: Michigan
Typical Educational Level: Post-Secondary vocational training

Description: Repair electronic equipment such as industrial controls, telemetering and missile control systems, radar systems, transmitters, and antennae, using hand tools and testing instruments. Exclude repairers of data processing equipment and home entertainment equipment.

Wages and Trends:

Electronics Repairers, Commercial and Industrial Equipment

Wages:

Location	Median, 1998		Midrange, 1998	
	hourly	annual	hourly	annual
United States	$17.11	$35,600	$13.37 -	$27,800 -
Michigan	$16.21	$33,700	$12.10 -	$25,200 -

How to interpret wage data

Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey; Michigan Department of Career Development

Rank this occupation across all states by median wage.

Trends:

Location	Employment		Percent change	Average annual job openings (due to growth and net
	1998	2008		
United States	71,600	80,600	13%	2,920
Michigan	1,250	1,500	18%	60

How to interpret trends

Source: Bureau of Labor Statistics, Office of Employment Projections; Michigan Department of Career Development

Rank this occupation across all states by percent change.

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-Fastest Growing -Most Openings -Largest Employment -Declining Employment -Highest Paying

Fastest Growing Occupations

Requiring Post-Secondary Training or an Associate's Degree

Listed below are the 25 occupations projected to grow the fastest during the 1998-2008 time period that require post-education or training below the bachelor's degree. Click on an occupation to learn more about it, including state data.

Occupation	Employment		Percent change *
	1998	2008	
Computer Support Specialists	429,300	868,700	102%
Paralegal Personnel	136,000	220,400	62%
Data Processing Equipment Repairers	79,300	116,600	47%
Medical Records Technicians	92,400	132,900	44%
Physical and Corrective Therapy Assistants and Aides	82,100	118,000	44%
Respiratory Therapists	86,400	123,200	43%
Surgical Technologists and Technicians	54,000	76,600	42%
Dental Hygienists	143,300	201,400	41%
Occupational Therapy Assistants and Aides	18,600	26,000	40%
Cardiology Technologists	20,800	29,000	39%
Central Office and PBX Installers and Repairers	44,400	58,800	32%
Emergency Medical Technicians	150,000	197,400	32%
Manicurists	48,900	61,500	26%
Registered Nurses	2,078,800	2,529,700	22%
Licensed Practical Nurses	692,000	828,400	20%
Radiologic Technologists	161,700	194,100	20%
Travel Agents	137,900	163,200	18%
Automotive Mechanics	789,600	921,500	17%
Electrical and Electronic Engineering Technicians and Technologists	334,800	391,100	17%
Radiation Therapists	12,400	14,400	17%
Funeral Directors and Morticians	27,500	32,000	16%
Veterinary Technicians and Technologists	32,000	37,200	16%
Dancers and Choreographers	28,700	32,600	14%

D of L

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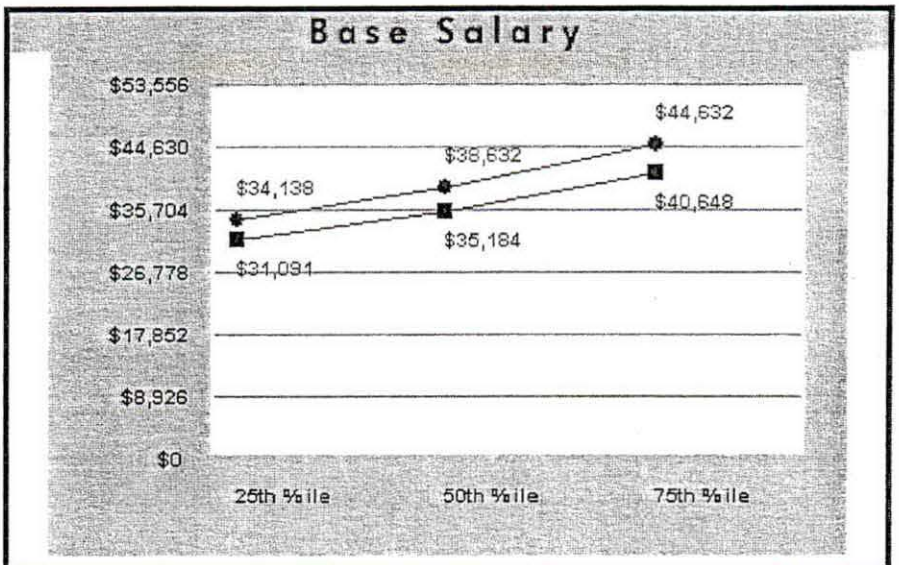
Back to the Salary Wizard

Salary Wizard™

A typical Telecommunications Technician I working in metro Michigan -- Detroit is expected to earn a median base salary of $38,632. Half of the people in this job are expected to earn between $34,138 and $44,632 (i.e., between the 25th and 75th percentiles). These numbers are based on national averages adjusted by geographic salary differentials.
(This data is as of August, 2001)



Telecommunications Technician I	Low	Median	High
●—Michigan -- Detroit	$34,138	$38,632	$44,632
■—the United States	$31,091	$35,184	$40,648

Telecommunications Technician I
Installs, troubleshoots, repairs and maintains telecommunications equipment. Provides reports, completes requests for new service, determines methodology for installing telephone service, determines appropriateness of moderate equipment changes or modifications, call switches, test trunks, test links and installs communication circuits. May require an associate's degree or its equivalent and 0-3 years of experience in the field or in a related area. Has knowledge of commonly-used concepts, practices, and procedures within a particular field. Relies on instructions and pre-established guidelines to perform the functions of the job. Works under immediate supervision. Little creativity is required. Typically reports to a project leader or manager.

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Occupation Report

Occupation: Telephone and Cable Television Line Installers and Repairers
State: Michigan
Typical Educational Level: Long-term on-the-job training

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Description: String and repair telephone and television cable and other equipment for transmitting messages or TV programming. Duties include locating and repairing defects in existing systems; placing, rearranging, and removing underground or aerial cables; installing supports, insulation, or guy wire systems; and other auxiliary tasks necessary maintain lines and cables.

Wages and Trends:

Telephone and Cable Television Line Installers and Repairers

Wages:

Location	Median, 1998		Midrange, 1998	
	hourly	annual	hourly	annual
United States	$15.75	$32,800	$10.97 - $21.42	$22,800 - $44,600
Michigan	$15.06	$31,300	$11.16 - $20.50	$23,200 - $42,600

How to interpret wage data

Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey; Michigan Department of Career Dev

Rank this occupation across all states by median wage.

Trends:

Location	Employment		Percent change	Average annual job openings (due to growth and net replacement)
	1998	2008		
United States	180,200	234,700	30%	11,310
Michigan	5,700	6,800	18%	290

How to interpret trends

Source: Bureau of Labor Statistics, Office of Employment Projections; Michigan Department of Career Development

Rank this occupation across all states by percent change.

Knowledge, Skills, and Abilities

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The most important knowledge, skills, and abilities (KSAs) are listed for **Telephone and Cable Television Line Insta Repairers**.

Knowledge:

- ***Telecommunications*** - Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.
- ***Computers and Electronics*** - Knowledge of electric circuit boards, processors, chips, and computer hardware software, including applications and programming.
- ***Engineering and Technology*** - Knowledge of equipment, tools, mechanical devices, and their uses to produce light, power, technology, and other applications.
- ***Mechanical*** - Knowledge of machines and tools, including their designs, uses, benefits, repair, and maintenanc
- ***Mathematics*** - Knowledge of numbers, their operations, and interrelationships including arithmetic, algebra, ge calculus, statistics, and their applications.

Skills:

- ***Installation*** - Installing equipment, machines, wiring, or programs to meet specifications.
- ***Repairing*** - Repairing machines or systems using the needed tools.
- ***Troubleshooting*** - Determining what is causing an operating error and deciding what to do about it.
- ***Equipment Maintenance*** - Performing routine maintenance and determining when and what kind of maintenan needed.
- ***Problem Identification*** - Identifying the nature of problems.
- ***Testing*** - Conducting tests to determine whether equipment, software, or procedures are operating as expected

Abilities:

- ***Manual Dexterity*** - The ability to quickly make coordinated movements of one hand, a hand together with its ar hands to grasp, manipulate, or assemble objects.
- ***Control Precision*** - The ability to quickly and repeatedly make precise adjustments in moving the controls of a or vehicle to exact positions.
- ***Oral Comprehension*** - The ability to listen to and understand information and ideas presented through spoken and sentences.
- ***Deductive Reasoning*** - The ability to apply general rules to specific problems to come up with logical answers

involves deciding if an answer makes sense.

- ***Information Ordering*** - The ability to correctly follow a given rule or set of rules in order to arrange things or ac certain order. The things or actions can include numbers, letters, words, pictures, procedures, sentences, and mathematical or logical operations.
- ***Near Vision*** - The ability to see details of objects at a close range (within a few feet of the observer).
- ***Oral Expression*** - The ability to communicate information and ideas in speaking so others will understand.

Need to find a course to increase your knowledge, skills, or abilities? Try finding a course in America's Learning eXcha

Source: Occupational Information Network, 1998

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Occupations with the Most Openings

Requiring Post-Secondary Training or an Associate's Degree

Listed below are the 25 occupations with the largest number of projected openings during the 1998-2008 time period t require post-secondary education or training below a bachelor's degree. Click on an occupation to learn more about it, state data.

Occupation	1998 Employment	Average annual job open (due to growth and ne replacements)
Registered Nurses	2,078,800	79,400
Computer Support Specialists	429,300	46,600
Automotive Mechanics	789,600	32,820
Licensed Practical Nurses	692,000	28,450
Hairdressers, Hairstylists, and Cosmetologists	605,200	21,770
Electrical and Electronic Engineering Technicians and Technologists	334,800	12,470
Paralegal Personnel	136,000	9,580
Dental Hygienists	143,300	9,030
Emergency Medical Technicians	150,000	8,450
Legal Secretaries	285,100	8,350
Sales Agents, Real Estate	284,600	8,310
Medical Records Technicians	92,400	6,340
Medical Secretaries	219,300	6,220
Physical and Corrective Therapy Assistants and Aides	82,100	5,620
Radiologic Technologists	161,700	5,490
Travel Agents	137,900	5,440
Respiratory Therapists	86,400	4,970
Data Processing Equipment Repairers	79,300	4,860
Surgical Technologists and Technicians	54,000	3,600
Photographers	149,400	3,360
Electronics Repairers, Commercial and Industrial Equipment	71,600	2,920
Central Office and PBX Installers and Repairers	44,400	2,880
Stenographers and/or Court Reporters	110,000	2,860
Manicurists	48,900	2,530
Psychiatric Technicians	66,000	1,640

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Fastest Growing Occupations

Requiring Post-Secondary Training or an Associate's Degree

Listed below are the 25 occupations projected to grow the fastest during the 1998-2008 time period that require post-s education or training below the bachelor's degree. Click on an occupation to learn more about it, including state data.

Occupation	Employment		Percent c	
	1998	2008		
Computer Support Specialists	429,300	868,700	102%	10
Paralegal Personnel	136,000	220,400		6
Data Processing Equipment Repairers	79,300	116,600	47%	4
Medical Records Technicians	92,400	132,900		4
Physical and Corrective Therapy Assistants and Aides	82,100	118,000		4
Respiratory Therapists	86,400	123,200		4
Surgical Technologists and Technicians	54,000	76,600		4
Dental Hygienists	143,300	201,400		4
Occupational Therapy Assistants and Aides	18,600	26,000		4
Cardiology Technologists	20,800	29,000		3
Central Office and PBX Installers and Repairers	44,400	58,800		3
Emergency Medical Technicians	150,000	197,400		3
Manicurists	48,900	61,500		2
Registered Nurses	2,078,800	2,529,700		2
Licensed Practical Nurses	692,000	828,400		2
Radiologic Technologists	161,700	194,100		2
Travel Agents	137,900	163,200		1
Automotive Mechanics	789,600	921,500		1
Electrical and Electronic Engineering Technicians and Technologists	334,800	391,100	17%	1
Radiation Therapists	12,400	14,400		1
Funeral Directors and Morticians	27,500	32,000		1
Veterinary Technicians and Technologists	32,000	37,200		1
Dancers and Choreographers	28,700	32,600		1
Electronics Repairers, Commercial and Industrial Equipment	71,600	80,600	13%	1
Legal Secretaries	285,100	322,000		1

** Note: The national average percent change is 14%.*

Source: Bureau of Labor Statistics, Office of Employment Projections

AREAS	EMPLOYERS	DESCRIPTIONS/STRATEGIES
CIVIL Structural Urban and Community Planning Construction Environmental Water Resources Transportation and Pipeline Geotechnical Photogrammetry, Surveying and Mapping Materials	Construction industry Engineering or architectural firms Utility companies Oil companies Telecommunications businesses Manufacturing companies Consulting firms Railroads	***Broad discipline of "doers" providing service to the community through development and improvement. Works extensively with other professionals involved with the community. Provides opportunity to work outdoors.*** Learn to work well within a team. Develop strong communication and interpersonal skills. Develop physical stamina for outdoor work. Get experience in organizing and directing workers and materials. Ability to visualize objects in three dimensions helpful. Demand has remained steady due to broad nature of discipline. States may require licensing/registration.
ELECTRICAL/ELECTRONIC Power Electronics Power Systems Communications Electronics Control Systems Digital Signal Processing Microelectronics Image Processing & Robotics Computer Engineering Plasma Engineering Computer Vision	Manufacturing firms and industry including: Aeronautical/Aerospace Automotive Business machines Professional and scientific equipment Consumer products Chemical and petrochemical Computers Construction Defense Electric utilities Electronics Environmental Food and beverage Glass, ceramics and metals Machine tools	***A field in touch with a wide and growing range of applications such as the "information highway," exploration of outer space, and a revolution in medical diagnosis and treatment.*** Develop effective verbal and written communication skills. Get experience in working as part of a team. Acquire capacity for details. Develop interpersonal skills. Get involved in research.

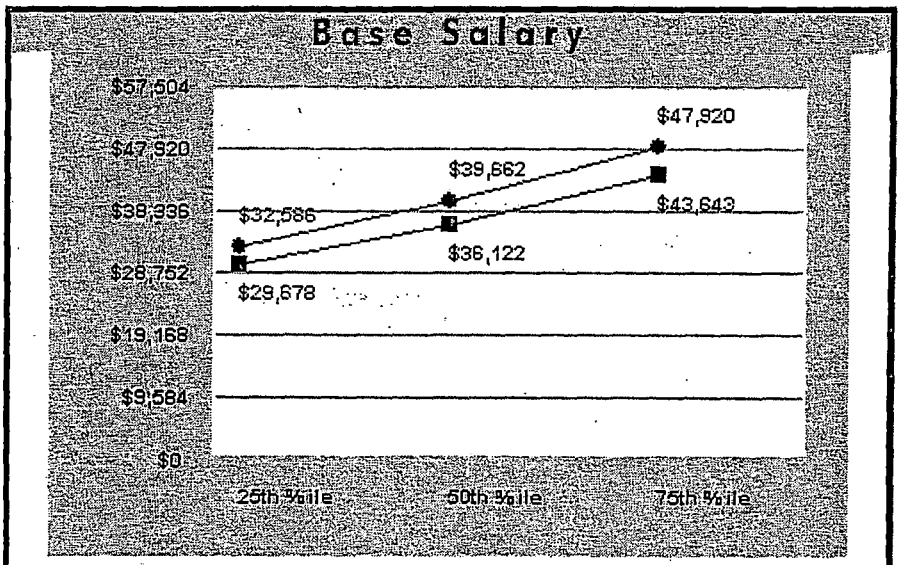
AREAS	EMPLOYERS	DESCRIPTIONS/STRATEGIES
	Electrical/Electronic, Continued Mining and metallurgy Nuclear Oceanography Pulp and paper Textiles Transportation Water and wastewater Public utilities Federal government including: Armed forces National Aeronautics and Space Administration (NASA) National Institutes of Health Bureau of Standards Department of Defense Various commissions Consulting firms Free-lance consulting	
INDUSTRIAL Operations Research Applied Behavioral Science Systems Manufacturing Management	Manufacturing industries Accounting firms Retail distribution organizations Banks and finance organizations Hospitals and healthcare organizations Educational and public service agencies Transportation industries Construction industries Public utilities Electrical and electronics machinery industries Consulting firms	***Discipline links management and operations by improving productivity through a "big picture" approach; serves human needs and works with people.*** Take courses in psychology, sociology and anthropology. Earn MBA or Ph.D. for advancement in management/administration.

salary.com

Back to the Salary Wizard

Salary Wizard

A typical Electrical Utility Trouble Shooter working in metro Michigan -- Detroit is expected to earn a median base salary of $39,662. Half of the people in this job are expected to earn between $32,586 and $47,920 (i.e., between the 25th and 75th percentiles). These numbers are based on national averages adjusted by geographic salary differentials.
(This data is as of August, 2001)



Electrical Utility Trouble Shooter	Low	Median	High
Michigan -- Detroit	$32,586	$39,662	$47,920
the United States	$29,678	$36,122	$43,643

Electrical Utility Trouble Shooter
Installs, tests, troubleshoots, and repairs electrical utility equipment. Requires a high school diploma or its equivalent. May be required to be certified in an area of specialty with 2-4 years of experience in the field or in a related area. Familiar with standard concepts, practices, and procedures within a particular field. Relies on limited experience and judgment to plan and accomplish goals. Performs a variety of tasks. Works under general supervision. A certain degree of creativity and latitude is required. Typically reports to a supervisor/manager.

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FIND A JOB Enter

Salary Wizard

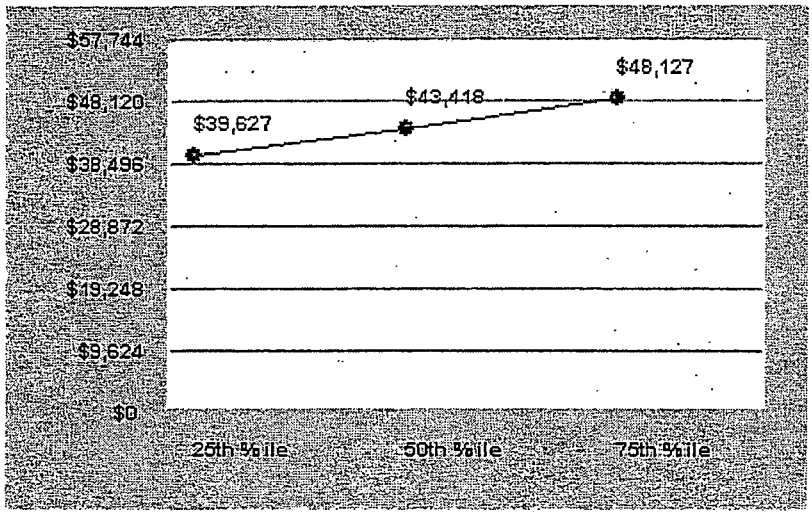
Tell a friend | Print chart | How is this calculated? | New search

A typical Telecommunications Engineer I working in metro Michigan -- Detroit is expected to earn a median base salary of $43,418. Half of the people in this job are expected to earn between $39,627 and $48,127 (i.e., between the 25th and 75th percentiles). These numbers are based on national averages adjusted by geographic salary differentials.

(This data is as of August, 2001) Employers: your job posting could be here.

Base salary | Total cash compensation

page 1 of 2



Telecommunications Engineer I	Low	Median	High
Michigan -- Detroit	$39,627	$43,418	$48,127

Update - July 2001 Why have some market salaries gone down?

new
One-click job search

Click on the logos to go directly to job openings for Telecommunications Engineer I in your area.

CareerJournal.com | NetTemps | USJobBoard

Telecommunications Engineer I

Analyzes telecommunications functions of organizations. Works to develop, improve, maintain, and implement network. May require a bachelor's degree in area of specialty and 0-2 years of

Related jobs Hel

Telecommunications Enginee I openings in Michigan -- Detroit:

Career Journal
Hotjobs
Headhunter

Job Finder

Job seeke

Enter job title/keyword(s)

Go

Advanced search

Resume Center

Job seeke

Post a resume
Resume writing tips
Business correspondence tips

Candidate Finder

Employe

Post a job online
Browse resume database
What is a job portal?

experience in the field or in a related area. Has knowledge of commonly-used concepts, practices, and procedures within a particular field. Relies on instructions and pre-established guidelines to perform the functions of the job. Works under immediate supervision. Typically reports to a supervisor or manager.

Compare Telecommunications Engineer I working in Michigan -- Detroit to...

1. The U.S. national average for Telecommunications Engineer I

2. The same job in a different location choose location

3. A related job (Michigan -- Detroit) choose related job

Related jobs: (create salary report for job title)

Aerospace Engineer I
Aerospace Engineer II
Aerospace Engineer III
Airport Engineer
Ceramics Engineer
Ceramics Engineer, Sr
Chemical Engineer I
Chemical Engineer II
Chemical Engineer III
Civil Engineer I
Civil Engineer II
Civil Engineer III
Director Engineer
Electrical Controls Engineer I
Electrical Controls Engineer II
Electrical Controls Engineer III
Electrical Engineer I
Electrical Engineer II
Electrical Engineer III
Engineering Aide I
Engineering Aide II
Engineering Aide III
Environmental Engineer
Environmental Engineer, Sr
Hardware Engineer I
Hardware Engineer II
Hardware Engineer III
Industrial Engineer I
Industrial Engineer II
Industrial Engineer III
Industrial Engineering Manager
Industrial Engineering Technician I
Industrial Engineering Technician II
Industrial Engineering Technician III
Manager Engineering
Manufacturing Engineer I
Manufacturing Engineer II
Manufacturing Engineer III
Materials Engineer I
Materials Engineer II
Materials Engineer III
Mathematical Technician
Mechanical Engineer I
Mechanical Engineer II
Mechanical Engineer III
Nuclear Engineer I
Nuclear Engineer II
Nuclear Engineer III
Petroleum Engineer I
Petroleum Engineer II
Petroleum Engineer III
Production Engineer I
Production Engineer II
Production Engineer III
Project Manager - Engineer
Quality Assurance Engineer I
Quality Assurance Engineer II
Quality Assurance Engineer III
Reliability Engineer I
Reliability Engineer II
Reliability Engineer III
Sales Engineer
Service Engineer I
Service Engineer II

Computer Hardware Engineering

Associate in Applied Science
Auburn Hills

Current Program

Major Requirements			Credits
CIS 1050		Personal Computer Productivity Tools	4
ECT 2080	*	Introduction to Microcontrollers	4
ECT 2150	*	Computer Repair I	4
ECT 2160	*	Computer Repair II	4
EEC 1020	*	DC Fundamentals	3
EEC 1040	*	AC Fundamentals	3
EEC 1050	*	DC and AC - Circuit Analysis	3
EEC 1350	*	Digital Logic	3
			28

Required Supportive Courses			
		and PCB Layout	3
ENG 1450[2]	★	Writing and Reading for Problem Solving	3
ENG 2200	★	Professional Communication	4
or			
MAT 1630	★	College Algebra and Trigonometry	4
			14-17
Additional General Education Credits			10
		Total Credits Earned	59-62
Necessary Electives to Total			62

Proposed Replacements for EEC & ELT Courses

Major Requirements			Credits
CIS 1050		Personal Computer Productivity Tools	4
CIS 1305	*	Cisco Internetworking I	4
CIS 1310	*	Cisco Internetworking II	4
ECT 2080	*	Introduction to Microcontrollers	4
ECT 2150	*	Computer Repair I	4
ECT 2160	*	Computer Repair II	4
EEC 1050	*	DC and AC - Circuit Analysis	3
EEC 1350	*	Digital Logic	3
			30

Required Supportive Courses			
ENG 1450[2]	★	Writing and Reading for Problem Solving	3
ENG 2200	★	Professional Communication	4
MAT 1150	★	Ellementary Algebra	4
~~MAT 1630~~	~~★~~	~~College Algebra and Trigonometry~~	~~4~~
			15-18
Additional General Education Credits			10
		Total Credits Earned	58-62
Necessary Electives to Total			62

OAKLAND
COMMUNITY
COLLEGE

TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Comparable Courses/Programs and Trends for the CHT Program
DATE: February 15, 2006

To date, there are six community colleges defined as Very Large Suburban Community Colleges. [1]. Their attributes include:

- Enrolling more than 7500 students
- Being public colleges with a suburban campus located near a major city less populated than urban areas
- Enrolling students who have transportation into the city which can take advantage of a diversity of cultural events

For purposes of this review, the Very Large Suburban Community College must also embrace an electronics curriculum.

1) OAKLAND COMMUNITY COLLEGE
   - The program description has already been addressed at the onset of this review.

The following describes observations, similarities and differences in the electronics programs at five (5) other community colleges in the State of Michigan as they relate to the Electronics Program at Oakland Community Colleges.

2) HENRY FORD COMMUNITY COLLEGE

SIMILAR
- AS Degree (63 cr), Certificate (38 cr)

DIFFERENT
- Recently combined DC Fundamentals (3 cr) and AC Fundamentals (3 cr) into one (4 cr) class
- Incorporates PLC's and motor control
- Incorporates a Co-op
- Incorporates hydraulics, pneumatics, technical physics as required supportive

[1] Source: Peterson's College Handbook, 2003

Please see attached

G. OUTCOMES ASSESSMENT

Coordinator: Complete this form after reviewing your most recent Program Assessment Plan.

1. How have you used the findings from your Program Assessment to improve your program?

   Yes - see previous sections

2. What revisions to your Program Assessment Plan would you suggest?

3. Discuss the SAGE findings that apply to the instruction in your Program.
   Obtain these findings from the Office of Assessment and Effectiveness.

OUTCOMES ASSESSMENT REVIEW SUMMARY:

Coordinator: Obtain the most recent copy of your Program Assessment from the Office of Assessment and Effectiveness. Please attach it to your Summary Report.

Program Assessment Plan
Computer Hardware Engineering Technology

Catalog Description
This Associate in Applied Science Degree is designed to provide the student with learning experiences that will develop skills required to install, diagnose problems and repair micro-processor control devices and peripheral equipment. Equipment will include items such as personal and business computers, monitors, terminals, printers, disk drives, and additional hardware. The program also offers preparation for the A+ Certification exam which allows the graduate or certificate recipient the opportunity to function as a registered Certified Electronics Technician upon successfully passing the International Society of Certified Electronics Technicians examination (ISCET). Once certified, the student is eligible to sit for a journeyman's test in one (1) of eight (8) specialty areas of Computer, Video, Consumer, Industrial, FCC legal, Medical, Audio, and Communications. To qualify to sit for a journeyman exam, an existing certified technician must have acquired four or more years of education and/or experience in the electronics field.

Statement of Purpose
Provide fundamental, quality and student-centered learning opportunities for individuals seeking transfer and/or entry-level employment in desktop computer 1) upgrades, 2) preventative maintenance, 3) corrective service, and 4) communication services.

Learning Outcome 1 of 3
Graduates will have acquired the knowledge and skills necessary in preparation to sit for the COMPTIA A+ and Net+ external certification examinations. OK

Benchmark
80% of the students will be prepared to pass the COMPTIA A+ and Net+ exams by completing courses ECT 2150 and ECT 2160 with a combined average of at least a "B" grade. OK

OK

Assessment Method 1
In oral, written and practical mediums, students will be able to describe the proper functioning characteristics of a PC Desktop system in classes ECT 2150 and ECT 2160 with a combined average of at least a "B" grade. (nature)

Assessment Method 2
In oral, written and practical mediums, students will be able to describe the common malfunctioning characteristics of a PC Desktop system in classes ECT 2150 and ECT 2160 with a combined average of at least a "B" grade.

Assessment Date 6/1/2007 **Findings Sent to OAE Date 1**

Program Assessment Plan
Computer Hardware Engineering Technology

Learning Outcome 2 of 3
Students will learn steps to troubleshoot and correct computer hardware and operating system problems.

Benchmark
80% of the required 10 labs and lab reports in ECT 2150 will be completed with a grade of 80% or higher.

Assessment Method
Completed labs and related reported should be written in clear English language with acceptable paragraph structure, grammar, and content with a combined with at least a grade of "B" determined by the instructor.

Assessment Date 6/1/2007 **Findings Sent to OAE Date 1**

Learning Outcome 3 of 3
Graduates will have acquired the knowledge and skills necessary to sit for the Electronics Associate Level Exam administered by the International Society for the Certification of Electronics Technicians (ISCET).

Benchmark
Of the students from OCC who opt to sit for the Associate Level ISCET exam, 80% will pass and achieve the external certification

Assessment Method
Report from the Examination Director of ISCET:

Mr. Edward Clingman
3608 Pershing Avenue
Fort Worth, Texas 76107
1-800-946-0201

Assessment Date 6/1/2008 **Findings Sent to OAE Date 1**

The following text in **RED** was purged by Bob Powell on Tuesday, March 7, 2006 from the original document from Marty's Office

Learning Outcome
Students will develop oral and written technical communications skills.
Benchmark 1
Students will achieve 80% in evaluation by faculty against technical writing standards.
Assessment Method 1
All graduates must pass ENG 1450, Writing & Reading for Problem Solving.
Assessment Date 1 5/1/2005 **Findings Sent to OAE Date 1** 6/1/2005

Learning Outcomes
Graduates will have acquired the knowledge and non-technical problem-solving and communication skills necessary to enable them to transfer to other institutions.
Benchmark 1
Transfer institutions rate the program courses as transferable to their institution greater than 80%.
Assessment Method 1
Survey transfer institutions to assess the appropriateness of instructional content to provide optimum portability of credits and knowledge, and identify new transfer opportunities.
Assessment Date 1 5/1/2005 **Findings Sent to OAE Date 1** 6/1/2005

Learning Outcomes
Students will learn steps to create networks and assemble a server.
Benchmark 1
85% of 13 labs and lab reports in ECT 2160 will be completed with a grade of 90% or higher.
Assessment Method 1
Completed labs and lab reports submitted.
Assessment Date 1 4/1/2005 **Findings Sent to OAE Date 1** 5/1/2005

OAKLAND
COMMUNITY
COLLEGE

TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Interdisciplinary Interactions for EEC Core Courses and the CHT Program
DATE: March 17, 2006

To date, four (4) disciplines require EEC courses for their programs. (please see attached)

1) **Robotics/Automated Systems Technology** - Teaching faculty Doug St. Clair has responded to the "FACULTY SURVEY OF INTERDISCIPLINARY INTERACTIONS" . Please see OCC Catalog 2001/2002 page 261 in which ROB 2040 may require EEC 1040 as a prerequisite. Mr. St. Clair indicated that for the supporting class of EEC 1040, it is working well where they use the concepts in their AC/DC controller maintenance course.

2) **Electrical Trades Technology** - Teaching faculty indicated that the interdisciplinary courses are working well with no revisions required at this time

The interdisciplinary courses are EEC 1020, 1040, 1050, 1350, and 1270

3) **Computer Hardware Technology** - Teaching faculty indicated that the interdisciplinary courses are working well with no revisions required at this time

The interdisciplinary courses are EEC 1020, 1040, 1050, 1350, and 1270

4) **Multi-Skilled Manufacturing Technology** - Teaching faculty indicated that the interdisciplinary courses are working well with no revisions required at this time

The interdisciplinary course is EEC 1040

changing?

OAKLAND COMMUNITY COLLEGE

COLLEGE CURRICULUM REVIEW COMMITTEE

WELCOME TO THE CURRICULUM REVIEW SELF-STUDY PROCESS

Discipline/Program CHT Coordinator(s) Dr. Robert A. Powell

CRC Mentor Gail Mays Review Date: March 17, 2006

Thank you for agreeing to coordinate the Curriculum Review in your area. As Discipline/Program Review Coordinator, it is your responsibility to make sure the steps detailed below are completed by the Review Date. Your packet includes instructions and forms for completing the Review. If needed, a CRC mentor is available to you. Your Dean will also be able to provide meaningful assistance in completing this important task.

In the Part I-Core Review, the College asks your discipline/program to analyze its curriculum from a variety of perspectives. These include course offerings and contents, enrollment/retention, transfer trends, and plans for the future. An additional section of activities is contained in Part II. The nature of these review activities will depend on whether you are a member of a Discipline or a Program.

Included in this document to help you work on your review are: 1) Data Collection forms to distribute to your Discipline/Program colleagues and 2) Data Analysis forms with summary sections to help you complete your review. After filling out these forms, you will finalize your review by re-printing all of the summary sections on one Summary Report Form for submission.

Once again, thank you for agreeing to work on this very important process with your colleagues. Together we will constantly strive to ensure the excellence of instruction at OCC.

College Curriculum Review Membership
2005-2006

Lin Armitage (HL)	Diane Hill (OR)	Janet Peart (AH)
Thomas Boozer (AH)	Tony Ingram (OR)	Letyna Roberts (ex-officio)
Nadia Boulos (HL)	Shelley Larson (RO/SF)	Karen Robinson (HL)
Charlott Couch (RO/SF)	David Mathews (RO/SF)	Beverly Stanbrough (RO/SF)
Jennifer Craft (AH)	Gail Mays (AH)-Chair	Bob Zemke (OR)

CORE REVIEW
A. COURSE CATALOG DESCRIPTION

Coordinator: Complete this form after reviewing the Course Catalog Data Collection forms from members of your Discipline/Program on all of the courses listed in the Catalog.

List every course that is listed in the catalog. Check where revision is indicated or no revisions seem necessary. Please, add lines where needed.

	Revision needed	No Revision necessary
Course Number EEC1020	✓	✓
Course Number EEC1040		✓
Course Number EEC1050		✓
Course Number EEC1270		✓
Course Number EEC1350		✓
Course Number ELT2070	✓	— This course is going to be purged as of 2006 Fall
Course Number ECT2080		✓
Course Number ECT2150		✓
Course Number ECT2160		✓
Course Number		

COURSE CATALOG DESCRIPTION REVIEW SUMMARY:

~~Catalog Descriptions for all courses are accurate, clear, appropriate and current. One course description however – ELT 2070 – needs a minor change i.e. from "---- implemented with basic logic elements such as flip flop latches and gate which are fundamental to logic systems" – TO – "implemented with microcontrollers which are now fundamental to logic systems".~~

CORE REVIEW
B. SYLLABUS REVIEW, CONTINUED

***Coordinator:** After reviewing the Data Analysis forms on all the courses in the Discipline/Program, please summarize your analysis of whether or not there are course syllabi in your Discipline/Program that need revision due to inconsistencies or omissions, or other issues.*

SYLLABUS REVIEW SUMMARY:

All syllabi for all courses are accurate, clean, current & appropriate

OAKLAND COMMUNITY COLLEGE

TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Staff Development re: Electronics (ELE) & CHT Programs - Discipline of One
DATE: January 18, 2001/Revised 3/17/2006

Staff development activities organized for full-time and adjunct faculty

- Taken as a general statement, these activities are on record as those provided by PDTC.
  Powell: Please see attached memo dated April 20, 2001 from Mary Ston
  Fonda: Attended PDTC Saturday Event for Adjunct - Fall 01'. Please see Data Collection Documents

Additional Staff development needs

- PDTC offerings adequate at this time

Career field continuing education

- Field requires continuing education.
  Powell: Please see attached memo dated January 25, 2001. This activity for Discipline Specific Training relative to Electronics Simulation Software was approved and training was completed February 2, 2001 in Orlando, FLA. : Please see attached memo dated April 20, 2001 from Mary Ston regarding tutoring activities to sit for the Society of Manufacturing Engineers (SME) CmfgT exam which I passed Fall 01'.
- Certificate of Completion - IGRIP Basic Training Course (Interactive Graphics Robot Instruction Program)
- Certification Administrator - International Society of Certified Electronics Technicians (ISCET)
- Certified Electronics Technician (ISCET) #MI369
- Certified Manufacturing Technologies (CMfgT) - Society of Manufacturing Engineers (SME)
- Certified Cisco Networking Instructor (CCNI)

OAKLAND
COMMUNITY
COLLEGE

TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Student Recruitment for EEC Core Courses, ELT & ECT courses, and ELE & CHT Programs
DATE: January 18, 2001

STUDENT RECRUITMENT - Recent

- Certification Administrator (CA) for International Society for Certified Electronics Technicians (ISCET)
- Course Equivalency Agreements with Ferris State University, Lawrence Technological University, Wayne State University (see attached)
- Technology Presenter - "2001 A CAREER ODYSSEY" . Oakland Technical Center, Northwest Campus, February 6, 2001. Included Power Point Presentation and handouts. I was later quoted in a Detroit News article dated March 4, 2001 relative to the event. (please see attached)
- Administered the American Technical Education Association Great Lakes Region Conference held at the Hilton Suites, Auburn Hills, along with the Auburn Hills Campus. This conference was co-sponsored by Oakland Schools and the Design and Manufacturing Alliance (DMA)
- Exhibited at the Open House activity for the Applied and Engineering Technologies. Targeted toward High School and Oakland Technical Centers students. Parents were also invited (November, 2000)
- Tech Check 2000 - Focus on Middle and High School Students but open to all (April, 2000)
- Quoted in the Detroit News, October 15, 2000 for "Employers Quickly Hire Circuit Board Assemblers" (please see attached)
- Applied & Engineering Technologies newsletter dated Fall, 2001. Described "On the fast track - Dr. Bob hard wires his curriculum" (please see attached)
- Personally, I have found "word of mouth" by students to be one of the best means of INDIRECT RECRUITMENT

STUDENT RECRUITMENT - Future

- "Careers in Technologies" - Informational session for High School Seniors (April 4, 2002)
- Technologies Career Breakfast for Counselors (March 6, 2002)
- Oakland Technical Center - Northwest Campus; 2002 Odyssey - Electronics presentation to OTC students and parents with respect to advanced placement, career awareness and certification (February 6, 2002)

CORE REVIEW
C. ENROLLMENT TRENDS AND STUDENT RETENTION

Coordinator: The Dashboard report on your Discipline/Program will collect the necessary data in regard to Enrollment Trends and Student Retention. Use this form to review that data in the following areas:

Enrollment (Use the Dashboard data on Average Section Size, Sections Filled to Capacity, Percent of Completed Sections, Percent Change in Headcount, and Percent Change in Credit Hours to discuss this area.)

39 Associate Degrees + 15 Certificates have been awarded over the 10 years of which the majority have been awarded over the past 4 years. ECT courses in steady decline over past 10 years & credit hours have fallen by 72%. Since 2004 5 ECT sections offered — none cancel. Average class size = 19.5 c's slight below college ave.

Minority Students (Use the Dashboard data on Minority Students to discuss this area.)

Slightly above the college-wide average

Student and Course Success (Use the Dashboard data on Percent of Withdrawals, Percent of Incompletes, and Student Course Completion Rate to discuss this area.)

Both the percent of students who withdraw and receive incompletes are below the college-wide average. 86% of all students successfully pass ECT course w/ a grade of "C" or better which is above the college wide average of 65%

ENROLLMENT TRENDS AND STUDENT RETENTION REVIEW SUMMARY:

Although student credit hours in ECT courses have steadily declined over the past 10 years, the ECT sections offered have not been cancelled and students complete an ECT course with a "C" or better grade.

CORE REVIEW
D. DISCIPLINE/PROGRAM NEEDS AND RESOURCES

Coordinator: Please summarize the needs, resources, and curriculum actions indicated on the Data Collection forms.

What resources or services does your Discipline/Program need?

The college needs a consistent and appropriate marketing plan for all courses, programs and services. A common awareness in the OCC community is that a significant number of Oakland County residents lack an understanding of where OCC is or that OCC even exists.

What curriculum revisions or development does your Discipline/Program see as beneficial to instruction?

Appropriate changes have already been made to include ECT courses with CIS courses with respect to Homeland Security. Future CATs will be created to other courses sequenced in CIS tech to allow for a technical skillset in

DISCIPLINE/PROGRAM NEEDS AND RESOURCES REVIEW SUMMARY:

programming, networking, A+, Net+, Cisco

E. INPUT FROM INTERNAL & EXTERNAL COMMUNITY

Coordinator: After reviewing the Data Collection forms on all the courses in the Discipline/Program, along with the collated data summary, please analyze and summarize these findings.

Faculty Perceptions of Occupational Programs and Disciplines Analysis

By & large the perception of faculty is most satisfactory with a majority of "Agrees"

Student Perception of Occupational Programs and Disciplines Analysis

Please see

Advisory Committee/Industry Perceptions of Occupational Programs/Disciplines Analysis

Please see attached Advisory Committee minute

INPUT FROM THE INTERNAL AND EXTERNAL COMMUNITY REVIEW SUMMARY

Please see attached

OAKLAND
COMMUNITY
COLLEGE

TO: Curriculum Review Committee
FROM: Dr. Robert A. Powell
SUBJECT: Input from the internal and external committee for EEC Core Courses, ELT courses, and the ELE Program
DATE: January 18, 2001

INTERNAL COMMUNITY (please see attached for all that is listed below)

- Oakland Community College Board Digest dated November 20, 2000 - "He [student Andrew Lauman] also praised his instructor, Dr. Robert Powell, the up-to-date instructional technology, the . . . "
- Sample thank you letters from students
- Thank you Certificate of Appreciation from Willie L. Lloyd for a presentation by me on the Third Annual co-op Day, February 6, 1997.
- Thank you letter from scholarship recipient Amy A. McGuckin
- Letter of congratulations from Cheryl A. Kozell, Workforce/Resource Development (August, 1998) for being chosen an outstanding instructor the General Motors Technical Education Program for Winter 1998.
- Thank you from AH Counseling Department for speaking at their in-service activity in February, 2000. The topic was "Use of Technology in the classroom"

FACULTY PERCEPTIONS OF OCCUPATIONAL EDUCATION PROGRAMS

- By and large, the perceptions are favorable in all areas except for those areas related to placement services, career planning, job related opportunities, student recruitment and program marketing
- Instructional support, laboratory facilities, equipment and materials get the highest scores

EXTERNAL COMMUNITY (please see attached for all that is listed below)

- ADVISORY COMMITTEE: Highlights of the minutes were as follows:
  - While faculty have been reviewing programs, searching for alternative delivery methods, such as flexible scheduling and fast-track offers, coursework quality remains a high concern with these methods
  - When attending full-time, the current recommended sequencing of courses for the students in the counseling guides are intended to show the fastest schedule from the beginning until graduation
  - One committee member inquired about the fast-track options. An OCC faculty said that these sections and classes are quite successful
  - Articulation agreements exist between High Schools Southfield, and Troy. The committee was in total support of the effort. These efforts were the work of Professor Willard Rush who has since retired. Dr. Sharon Blackman has the documentation.

EXTERNAL COMMUNITY (continued)

- The committee identified five top jobs created from the last meeting which are: Fire Alarm Technician, Automotive Diagnostic Technician, Electronic Technician, Medical Technician, and Telecommunication Installers. It was pointed out that Customer Service Skills were very important to job success.
- Teaching the basics of electronics has always served as the philosophy of the ADVISORY COMMITTEE members

- TRENDS IN TECHNOLOGY

  - Computer technology in vehicles (Onstar)
  - Locating places when driving (restaurants or gas stations, etc.).
  - Data collection for traffic control
  - Road designing by instrumentation
  - More economical to purchase new equipment instead of repairing damaged ones
  - Computers networked together without wiring
  - People working at home on the computer, flying in an airplane, driving in the car, and at work will all be networked
  - NATIONAL SKILL STANDARDS - For all my classes I have adopted COURSE CONTENT GOALS that comply with the Electronic Industries Association and Electronic Industries Foundation Occupational Skill Standards - Washington, DC: October 1995.

- General Motors letters of commendation for 1998 and 1999 regarding superior teaching performance (GM language no mine).
- Letter to the Chancellor from Mr. Robert Stephen Campbell, Department of English, Wayne County Community College on behalf of my instructional methodologies
- Thank you letter from FIDIA Corporation in which I invited them to present their company attributes to my classes

- STUDENT PERCEPTIONS OF OCCUPATIONAL EDUCATION PROGRAMS

  - Data clearly indicates that students are unaware of:
    1. Placement Services
    2. Career Planning
    3. Job Related Opportunities
    4. High scores on Instructional Support, laboratory facilities, equipment and materials and instructor knowledge

COMPUTER HARDWARE TECHNOLOGY & ELECTRONICS TECHNOLOGY ADVISORY COMMITTEE MEETING

February 15, 2001

ELT Members Present:	Cindy Ball, Daniel Bednarski, Michael Bednarski , Richard Collins, Rudy Latzko
CHT Members Present:	Gerald Clute, Robert Colenso, Richard Collins, Gary Groce, Andrew Hartsig
OCC Members Present:	Dr. Sharon L. Blackman, Willard Rush, Rhonda Gaines, Marikay Clancy, Mike Clancy, Carole Baier

Welcome and Review of Minutes

Dr. Sharon Blackman opened the meeting by introducing herself and invited the group to introduce themselves. The minutes of the Computer Hardware Technology Advisory Committee meeting held on March 16, 2000 were reviewed and approved. The minutes of the Electronics Technology Advisory Committee meeting held on February 23, 2000 were approved with the correction that William Robinson sat in for Gary Groce at the last meeting.

Program Update

Enrollment trends

Enrollment trends reports were passed out to the committee. Dr. Blackman took the committee through a review of enrollments in Computer Hardware Technology (CHT), Electronics Technology (ELT), and Electrical Trades for the past three years. The reports showed the enrollments with breakdowns between day and evening classes, which made clear that the enrollments were very heavy in evening. Dr. Blackman also explained about cancelled and piggyback classes.

Degree trends

Dr. Blackman explained the number of degrees and certificates, in both the Electronics and Computer Hardware Programs. Mr. Rush described how students come to OCC, take a couple of CHT classes and get a job in repair, then later return to school for further study.

Counseling Guides

The department has put together a counseling guide for the Electronics and Computer Hardware areas. Dr. Blackman stated that it takes an average of seven years for technology students to complete a degree because the majority of these students are enrolled part-time. Faculty has been reviewing programs, searching for alternative delivery methods, such as flexible scheduling and fast-track offerings. However, coursework quality remains a high concern with these methods.

Dr. Blackman informed the committee that as advisory members, one of the challenges is to ensure that we are maintaining the quality of our programs, and assist us in being forward thinking so that when there are new trends up the road, OCC can include that information in the curriculum. Advisory members also provide advice as to the types of equipment and resources necessary for the programs. When attending full-time, the current recommended sequencing for the students in the counseling guides are intended to show the fastest schedule from the beginning until graduation.

Dr. Blackman asked if there were any questions, and Mr. Richard Collins really liked the fast-track options. Mr. Rush said that Dr. Powell has been tracking these sections and the classes are quite successful.

Report on High School Articulations

Mr. Bill Rush informed the group that there are now articulation agreements between OCC and Southfield, Troy, and Clarkston schools. Copies of the agreements were passed out to the committee for review. OCC and the high schools make an agreement whereby OCC will give credit for what the high school is teaching in electronics towards OCC's Electronics Programs. The content of the courses are reviewed by OCC. Dr. Blackman explained how the articulation agreements work, including how the requirements by OCC form the school's classes. The agreements between OCC and the high schools are good for two years, and are evaluated before approval. Dual credit will also be discussed with each school system. The committee thought that high school articulation agreements with OCC were an excellent idea.

Electronics & Computer Hardware Technology Career Opportunities

Identify top five jobs from list created last meeting

Computer Hardware

- Basic PC Technician
- Hardware and Software Support Technician
- Network Support Technician
- DOS/NT PC Technician
- Software Troubleshooting

ELECTRONICS

- Fire Alarm Technician
- Automotive Diagnostic Technician
- Electronic Technician
- Medical Technician
- Telecommunication Installers

Customer service skills were also mentioned in both areas.

Is the program preparing students for those jobs?

Computer Hardware.

Mr. Andrew Hartsig commented that the CHT classes went into great depth about how the computer functions on the mechanical troubleshooting side, but are missing the software part of the computer. If OCC could incorporate a networking class in the program, many people would take the class. Network Technician and Network Administrator jobs are in high demand and with a very high salary...

The committee's opinion was that it was a possibility that students take some kind of CIS type class in networking, but related to the programs. Ms. Rhonda Gaines commented that CIS 163 had a course description stating that CIS 105 or experience equivalent to CIS 105 was needed before entering the class...

Dr. Blackman stated that OCC might have to come back to the committee to identify a class. Dr. Blackman stated that she and Mr. Rush had been talking about getting together with the CIS discipline regarding some of these issues. Since there is some overlap between these disciplines and both CHT and CIS people need to work on this area, possibly a new course will be developed.

Electronics

There was discussion regarding DDT 100 in the program, and whether that class will meet the needs of the students, since that class is not done on the computer. Dr. Blackman told the committee that OCC has articulation agreements with many high schools to give credit for DDT 100 and CAD 110. The committee also discussed alternative delivery methods, such as flex scheduling (7 1/2 week format), for the DDT 100 and DDT 114 course.

Trends in Technology

Computer technology in vehicles (Onstar)
Locating places when driving (restaurants or gas stations, etc.)..
Data collection for traffic control
Road designing by instrumentation
More economical to purchase new equipment instead of repairing the damaged equipment
Computers networked together without wiring
People working at home on the computer, flying in an airplane, driving in the car, and at work will all be networked..

Closing

Dr. Blackman thanked the group for their service as members of the advisory committee. The new members were presented with a small gift.

Respectfully submitted,

Carole Baier

OAKLAND
COMMUNITY
COLLEGE

Auburn Hills Campus
2900 Featherstone Road, Auburn Hills, MI 48326-2845 (248) 340-6500 Fax: (248) 340-6507

COMPUTER HARDWARE ENGINEERING TECHNOLOGY

ADVISORY COMMITTEE MEETING

March 18, 1999

Members Present:

Daniel C. Bednarski, Road Commission of Oakland County
John P. Brooks, N.I.C.E. Inc.
Richard T. Collins, Oakland Technical Center - Northeast Campus
Gary Groce, General Motors
Barry Jocque, OCC Computer Hardware Student
Raymond J. Williams, DaimlerChrysler Corporation

OCC Ex Officio Members Present:

Sharon L. Blackman, Ed.D., Dean of Technology
Patrick Dean, Paraprofessional
Sally Kalson, Coordinator of Cooperative Education
Verna M. Love, Counselor
Dr. Robert Powell, Faculty
Willard Rush, Faculty
Ruth Springer, Secretary

Welcome and Review of Minutes

Dr. Sharon Blackman, OCC's new Dean of Technology, introduced herself and welcomed the group. She invited the members to introduce themselves.

The minutes of the Computer Hardware Engineering Technology Advisory Committee meeting held on October 30, 1997, were reviewed and approved as submitted.

Dr. Blackman invited the group to review the minutes of the follow-up meeting of OCC staff which was held on February 19, 1998. She asked the members to comment on any items which they felt needed to be discussed.

Printed on Recycled Paper with Soy Ink

1. **That the College consider setting up an intranet which could be accessed by Computer Hardware students to obtain information and do assigned exercises from home if they wished.**

The group asked whether this recommendation had been completed, and Mr. Patrick Dean responded that it had.

Mr. Willard Rush reported that he is doing something new this semester. He has his own web site which students can access to take quizzes and submit lab assignments. About 20 percent of the students have taken advantage of this thus far. He believes the experiment has been successful enough to continue in the future.

The group asked whether this is done on the honor system, assuming that students are actually doing their own work and turning it in via the Internet. Mr. Rush agreed that there is a slim possibility that someone else could log on under a student's e-mail address and do the assignment for them. Mr. Rush still does testing on campus.

The group asked about recommendation 6 from the Electronics Advisory Committee minutes which was discussed at the last joint advisory committee meeting:

6. **That the College explore the possibility of including a co-op internship as part of the Electronics Technology curriculum.**

Dr. Robert Powell responded that a co-op class, ECT 170, already exists. It has been offered twice in the past, and no one registered for it. However, the course still exists, and could be used if a student was interested in a co-op experience. It could be activated and attached to another course as an independent study class. The faculty do not feel it is necessary to go through the curriculum process to formally make ECT 170 a part of the Electronics Technology curriculum.

Proposed Curriculum Revision

Copies of a proposed curriculum revision were distributed to the group (see attachment). Dr Blackman explained that the first page shows the current Computer Hardware Engineering Technology curriculum in a sequence that a student could follow to complete the program in two years. The second page shows the revised curriculum which is being proposed. It is being proposed that one credit hour be added to each of the following courses: EEC 102, DC Fundamentals; EEC 104, AC Fundamentals; EEC 105, DC and AC - Circuit Analysis; EEC 127, Basic Electronics; and EEC 135, Digital Logic. Each of these three-credit courses would become four-credit courses. Each of the five courses would have 60 contact hours.

Dr. Blackman explained that she feels it is important to present our curricula in this type of format so students can see how they could complete all their associate degree requirements, including general education courses, within two years if they were able to attend school full-time. She pointed out that ENG 151, Composition I, has been included in the first semester of study. This is to help students get the foundational English skills they will need to be successful in their other classes. OCC students take an average of five to eight years to complete a two-year associate degree program. Students often take their technical courses but not the general education requirements. Then employers tell us their employees don't have the skills they need in such things as communication, problem solving, and teamwork. We know that our students often take a few courses and then stop out. They may work awhile and then come back later to take a few more courses. Many take the technical courses they feel they need but never complete their associate degree. One of the criteria used to evaluate institutional effectiveness is how many students are completing our programs and graduating. The graduation rate for Technology Department programs in general has not been good. Dr. Blackman has asked the faculty to look at their programs to determine whether there are natural stop-out points where students might take a few classes and earn a certificate, then come back to earn another certificate, which would serve as building blocks to achieve the associate degree.

Dr. Blackman asked the group to consider and discuss the following questions: Who are the products of this program? What are we preparing students to do? Are there different levels of skills necessary for various types and levels of work? How can we increase enrollment and increase the number of program completers? We need to think about the competencies for each class and consider whether we are providing the instruction students need in each course. We also need the advisory committee to advise us about the future in this industry and what skills students will need to be employed in the future.

Mr. John Brooks responded that all the advisory committee members represent just a tiny portion of this industry. It is tremendously diverse, and what one branch needs may be the opposite of what another needs. He believes OCC should train students on the basics and then let them become specialized on the particular job they acquire. We need to concentrate on the core electronics curriculum, AC and DC, and then teaching such things as computer repair and microprocessor technology. He believes the curriculum is pretty well structured the way it is now, including a solid core of instructional areas which will be needed by everyone going into the field. If students have a basic understanding of electronics, they should be able to get a job and then move up within the company and become specialized in the particular industry where they are working.

Dr. Blackman pointed out that enrollment is declining in this program and in many of our Technology programs. She asked the group for their ideas on how to attract students to the program.

The group pointed out that the industry is growing fast now and hiring people with less skills. That is why enrollment is down. It was suggested that perhaps a certificate could be offered that included just the electronics core courses. This would document for employers that students have some understanding of electronics. Then they could take the rest of the courses later, perhaps even paid for by the employer. Students each have their own individual goals in taking classes. Some may already be employed and be taking classes to improve their skills. Students just out of high school may take two years at OCC and then move on to a four-year institution. Students may seek employment in companies of varying size and type. We need to find out what these various types of companies expect of our students.

Mr. Barry Jocque commented that he believes part of the reason for the lower enrollment and lack of program graduates has to do with the current curriculum. He stated that he, personally, does not have the degree because he has had a problem with a couple of courses, in particular the Math requirements. He believes that Math requirements could be hindering other students from graduating or discouraging students from entering the program. Mr. Jocque has difficulty seeing the relationship between the MAT 156, Trigonometry, requirement and the work he is doing now with computers.

Dr. Powell agreed that only a small part of the contents of MAT 156 are applicable to the Computer Hardware Engineering Technology Program.

Dr. Blackman pointed out that, when employment is steady, we do not have as many students, so we need to look at other ways to increase enrollment. Also, when we have fewer dollars to work with, programs have to produce in order to get the funds that are available. We need to educate our own internal community to understand that there are at least three possible types of program completers: Marketable skills achievers; competency certificate recipients; and associate degree recipients. Those who receive a competency certificate have a document that shows employers what they can do. We can document those who receive a certificate or degree, because they have completed a specific program of study. It is much more difficult to document the marketable skills achievers as to why they came, who they are, and where they went. We need to find a way to document these students who take only a few classes to meet their personal goals, in order to show how we contribute to the economic development of our community.

Mr. Rush asked for input from the committee on the possibility of doing a trial run during the Fall term of offering some courses in 7 ½ weeks rather than the usual 15-week time frame. Students could take EEC 102 the first 7 ½ weeks by attending class two nights a week, and then take EEC 104 the second 7 ½ weeks. The same content would be covered as in the longer 15-week course. Several group members expressed their belief that this would be a good idea.

Mr. Brooks mentioned that students sometimes become discouraged when they are unable to continue with their prescribed sequence of courses because a prerequisite course was canceled when they needed to take it. Dr. Blackman responded that a packet is being put together for

counselors to use in advising students so they know when each course will be offered in sequence. If they know a particular course will only be offered once a year, they can plan accordingly.

Mr. Brooks suggested that the College offer a continuing education program covering current subject matter which would be of interest to people in the industry. Dr. Blackman agreed, stating that we would need to identify the kinds of courses that would be attractive to industry. We could offer non-credit courses that would allow people to see what we do and might encourage them to come back and take regular courses and possibly complete the degree.

Dr. Blackman called the group's attention to the proposed curriculum revision which had been distributed earlier in the meeting. Mr. Gary Groce asked whether the two-year course sequencing layout could be included in the College Catalog. He suggested that it would be easier for students to make their plans if they could see the progression of courses in the catalog. Dr. Blackman agreed that that would be a good idea.

Dr. Powell asked the group for their input regarding the two Drafting classes which have been included in the curriculum in the past: DDT 100, Fundamentals for the Drafting Industry, and DRT 114, Electronics Drafting. Dr. Powell stated that DRT 114 is only offered during the Spring/Summer term and always conflicts with some other required course. In the past when these courses were put into the curriculum, it was appropriate that they be included because more of our students were hoping to move up into management in the electronics field. However, this no longer seems to be the case. We are asking the committee to advise us as to the applicability of these two courses to this program. If they could be deleted, it would allow us to add one credit hour to the previously mentioned five EEC courses without increasing the total number of credit hours required for the associate degree.

Mr. Brooks agreed that this would be a good idea. If a person was interested in drafting, they could take those classes, but it would not be required of everyone. It would be good to have another credit hour added to the advanced EEC classes, which would allow time to cover more material.

Mr. Jocque stated that he learned a great deal in DRT 114 about circuit boards and the theory behind them. He felt it would be a shame to lose that instruction from the program. He asked whether that content could be included in the other Electronics classes if DRT 114 was deleted from the program.

Dr. Powell responded that they do not currently have time in the EEC courses to teach everything they would like to cover, and there is a need to add more time to those courses. He does not believe that today's students need to take DRT 114. They do get some drafting in the simulation package used in other Electronics courses. If more time was added to those courses, they would be able to use all the material in the simulation package. Dr. Powell does not believe students need the level of drafting taught in DRT 114.

Dr. Powell mentioned that he would also like to eliminate BUS 131, Principles of Supervision, from the Electronics Technology curriculum. He does not believe it is needed by today's students.

Mr. Ray Williams asked whether the Trigonometry class is really necessary for this program. Dr. Powell responded that, with the extra credit hour added to the Electronics courses, they would be able to teach the trigonometry which is needed by students in this program.

Dr. Blackman reported that OCC is in the process of designing a new Manufacturing Technology degree curriculum for the Manufacturing Technology Academy program being undertaken in conjunction with Oakland Schools and under the financial sponsorship of DaimlerChrysler. The team of faculty working on this project includes Math, English, and Physics instructors, as well as faculty from the Technology Department. The team is considering the possibility of integrating academics into technical courses. For example, students might be able to receive Math credit for the math content in an Electronics course. However, there is a whole mind set within the College that would need to change in order to do this.

Mr. Groce responded that that would be a good idea. The College Algebra and Trigonometry courses teach students to think in an abstract and theoretical manner. However, students in technical programs need an emphasis on application rather than theory.

Ms. Verna Love commented that, in the past, technical math courses were included in the Technology programs. However, those courses are not accepted for transfer to four-year institutions, so some curriculum developers have included the standard Math classes in their programs.

Dr. Blackman pointed out that the committee is saying we should take a look at the Math requirements. However, the College's general education requirements for an associate degree include a Math requirement, so we need to stay within those requirements. Dr. Powell responded that we could retain MAT 154, College Algebra, as a part of the curriculum to meet the general education requirement, but delete MAT156, Trigonometry.

At Dr. Powell's request, the group began to vote regarding the proposed curriculum changes.

Mr. Rick Collins made a motion that DDT 100, Fundamentals for the Drafting Industry, and DRT 114, Electronics Drafting, be deleted from the Computer Hardware Engineering Technology curriculum. The motion was seconded by Mr. Williams and approved by the group.

Mr. Brooks made a motion that one credit hour be added to EEC 102, DC Fundamentals, and EEC 104, AC Fundamentals, and that one credit hour and fifteen contact hours be added to EEC 105, DC and AC - Circuit Analysis, EEC 127, Basic Electronics, and EEC 135, Digital Logic.

Each of these five courses would then be four credits and sixty contact hours. Mr. Groce seconded the motion, and it was approved by the group.

Mr. Groce suggested that the group amend the first motion to make clear their intention that the content of DRT 114 which is relevant to this program be included in the appropriate Electronics courses. The group agreed that this was their intent, and there was discussion about the need for such an amendment. The group concluded that it would be clear from the meeting minutes that this was the intention of the recommendation to delete the Drafting courses.

Mr. Williams made a motion that MAT 156, Trigonometry, be deleted from the Computer Hardware Engineering Technology curriculum. Mr. Jocque seconded the motion, and it was approved by the group.

The group asked about the possibility of offering competency certificates which could be subsets of the complete program certificate. Ms. Love referred the group to the Business Information Systems curriculum on page 58 of the College Catalog. After taking four designated courses, students may apply to the discipline for a competency certificate. After taking several more designated courses, they may receive a certificate from the College. The competency certificate is given by the Business Information Systems discipline, not the College, and prepares students for an entry level position.

The group recommended that the College consider offering such competency certificates as part of the Computer Hardware Engineering Technology curriculum. Dr. Blackman and Dr. Powell responded that we would need to first identify the competencies for all courses and then consider what courses might be included in such a certificate and what it would prepare a student to do. OCC staff will need to look at this possibility and bring it back to the committee for their input at a later date.

Mr. Brooks mentioned again that he would like to see OCC pursue the possibility of offering non-credit courses covering new areas that would be of interest to those working in the field.

The group suggested that OCC consider offering courses via distance learning. Perhaps the computer courseware which Dr. Powell has developed could be put on the Internet with certain safeguards. Students might do the majority of their work via the Internet and come to campus to take the midterm and final. This would make it possible to include students who live farther away if they only needed to come to campus a few times to take tests.

Appreciation

Dr. Blackman thanked the group for their service as members of the advisory committee. She presented each member with a certificate of appreciation and a small gift.

Advisory Committee Recommendations

1. That OCC consider offering some Electronics/Computer Hardware Engineering courses on a trial basis during Fall 1999 in a 7 ½-week time frame, so students could take one course the first 7 ½ weeks and another the second 7 ½ weeks.

2. That the College consider offering a continuing education program of non-credit courses covering current subject matter which would be of interest to people in the industry.

3. That the College consider including in the College Catalog the two-year course sequencing layout of the Computer Hardware Engineering Technology Program.

4. That DDT 100, Fundamentals for the Drafting Industry, and DRT 114, Electronics Drafting, be deleted from the Computer Hardware Engineering Technology curriculum.

5. That one credit hour be added to EEC 102, DC Fundamentals, and EEC 104, AC Fundamentals, and that one credit hour and fifteen contact hours be added to EEC 105, DC and AC - Circuit Analysis, EEC 127, Basic Electronics, and EEC 135, Digital Logic. Each of these five courses would then be four credits and sixty contact hours.

6. That MAT 156, Trigonometry, be deleted from the Computer Hardware Engineering Technology curriculum.

7. That OCC consider offering competency certificates which could be subsets of the Computer Hardware Engineering Technology certificate and degree program. These could be competency certificates granted by the discipline, similar to the competency certificate offered by the Business Information Systems discipline.

8. That OCC consider offering Electronics/Computer Hardware Engineering courses via the Internet with students coming to campus only to take tests.

Respectfully submitted,

Ruth Springer

(advw99:ect031899.min)

F. COMPARABLE COURSES/PROGRAMS AND TRENDS

Coordinator: Please use the data from the Comparable Courses/Programs and Trends Data Collection form to answer the following questions:

1. How does your program serve transferring students? Please discuss.

Artic a/ Yes, Ferris, Lawrence, WSU + EMU

2. Are your articulation agreements current? Please discuss.

Yes LTU Fall 2005
FERR W 2006

3. Discuss employment opportunities for students in both the current and future job market.

Please see attached

4. Discuss the changes that will be made in your program in response to current/future employer expectations and market trends.

In - say allied -

COMPARABLE COURSES/PROGRAMS AND TRANSFER REVIEW SUMMARY:

Please see attached

The Detroit News AND Free Press

careerbuilder

SUNDAY, MARCH 5, 2006 | SECTION N

Computer systems design and related services

Why it's hot:

This is another industry burgeoning because of technology developments. Businesses often don't have internal resources to implement new technologies or satisfy their changing needs. There are 146,000 computer systems design and related services establishments that can meet the specialized needs of a company, whether it's setting up a secure Web site, establishing an online marketplace, managing an onsite data center or help-desk support.

Who it employs:

The majority of workers in this industry are computer professionals, including computer systems analysts, computer engineers and computer programmers. Other jobs this industry generates are in sales, administrative and clerical, customer service, accounting and maintenance and repair.

Internet services, data processing and other related services

Why it's hot:

Increased demand for residential and business land-line and wireless services, cable service, high-speed Internet connections, and software will fuel job growth among Internet service providers and data processing services.

Who it employs:

Computer software engineers, engineering technicians, computer programmers, line installers and preparers, customer service representatives, human resources, training managers, accountants and sales representatives.

TAKING NOTES ON THE ECONOMY: OUTLOOK FOR MICHIGAN

Presentation for:

MSU Institute for Public Policy and Social Research Luncheon Forum

April 22, 2004

Mitchell E. Bean, Director
House Fiscal Agency
Michigan House of Representatives

TAKING NOTES ON THE ECONOMY: OUTLOOK FOR MICHIGAN

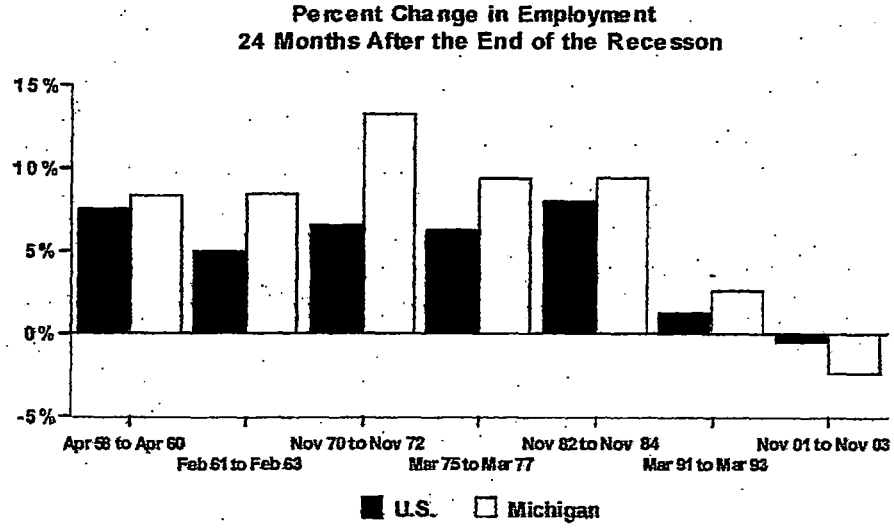
During the last three years the U.S. economy withstood a recession, terrorist attacks, numerous corporate scandals, and two ongoing wars. In many respects, the U.S. economy has demonstrated a great deal of resiliency.

The House Fiscal Agency is in the process of generating a forecast of the national economy, state economy, and state revenues that will be part of the Consensus Revenue Estimating Conference on May 18. Although the Agency forecast will not be finalized until just before the conference, I can share some generalities with you.

The national economy is improving, and the House Fiscal Agency expects the state economy to improve. But the job market in Michigan must improve first.

JOBS

The biggest negative for the national economy and the state economy has been the job market recovery—the slowest since WWII. In every other recovery, job growth was stronger and Michigan's job growth outpaced the nation. As shown in the graph below, that has not been the case this time.



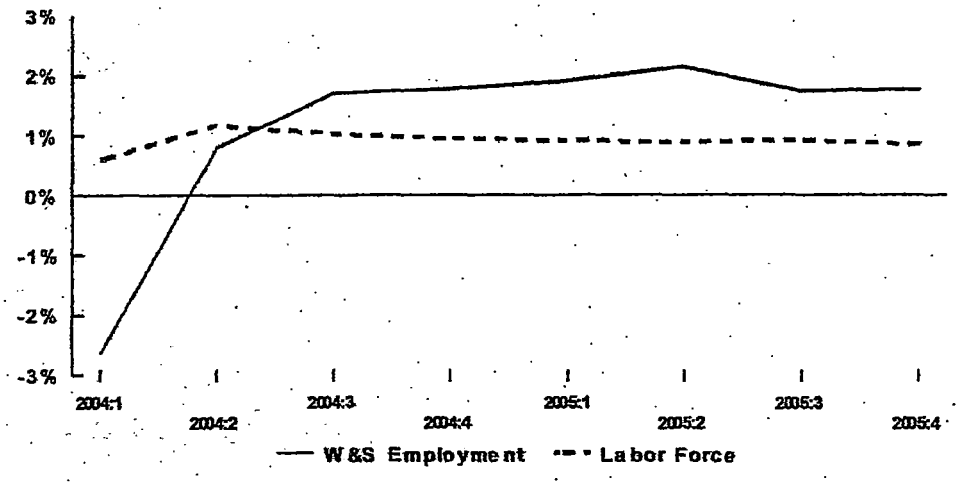
Despite modest gains last month, state employment in March 2004 was still 225,400 below state employment in March 2001. That includes 134,000 manufacturing jobs lost in three years—which represents 60 percent of total lost jobs.

Even though Michigan experienced job losses for the third consecutive year in 2003, there is positive news about the state job market: the rate of job loss now seems to be slowing.

In 2003, payroll employment fell by 70,000, but nearly half of all losses occurred in the first quarter of the year. By the end of the year, the quarterly job loss had slowed to 5,000. Available data indicated that job loss continued in the first quarter of 2004 and the state lost about 29,000 jobs—but this was less than half the rate of job loss in the first quarter of 2003.

The House Fiscal Agency expects the rate of job growth to turn positive in the second quarter of 2004. Job growth over the forecast horizon is reported in the following graph.

Michigan Employment Forecast



The U.S. economy and manufacturing, particularly the automobile industry, are the key drivers of state economic growth. Job losses in manufacturing continued in the first quarter of 2004, but the rate of job loss has slowed significantly.

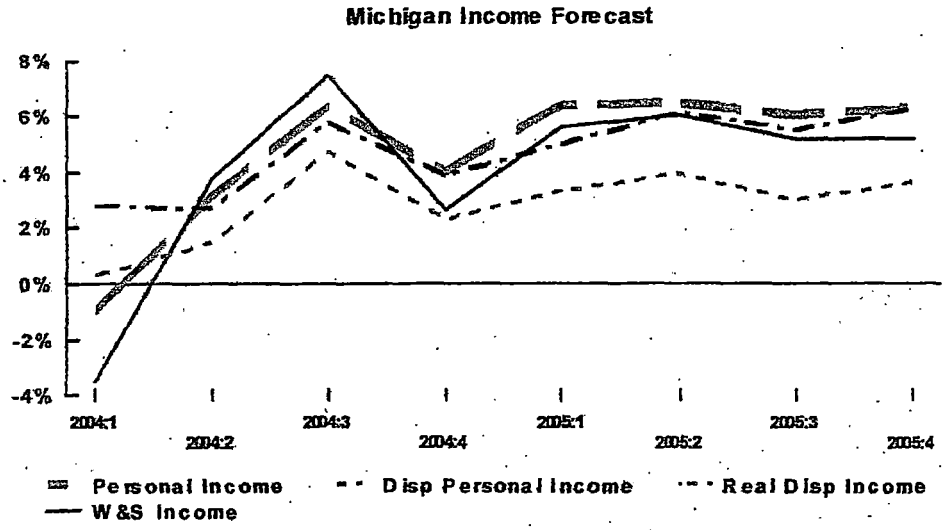
State job losses in the manufacturing sector averaged 12,000 jobs per quarter during the first half of 2003. By the fourth quarter of 2003, job losses slowed to 4,000, and fewer than 2,000 manufacturing jobs were lost in the first quarter of this year.

Another positive sign for the state economy is that the manufacturing workweek seems to be growing. For most of 2003, the average manufacturing workweek varied between 42 and 42½ hours. Since November 2003, the average workweek has increased to 43 hours. Increases in the average workweek are usually followed by increased hiring.

Improvement in manufacturing employment in Michigan in 2004 will be tempered by layoffs of autoworkers in Lansing and stamping workers in Grand Blanc, and by reductions in force at Delphi.

Expected gains in manufacturing employment in 2005 reflect, in part, the addition of a shift at the Lake Orion assembly plant and an increase in the payroll employment count attributable to the laid-off autoworkers in Lansing who shift into protected status programs.

Labor market gains lead to income gains. The House Fiscal Agency expects improvement in income growth over the forecast period as displayed in the next graph.



NATIONAL ECONOMIC OUTLOOK

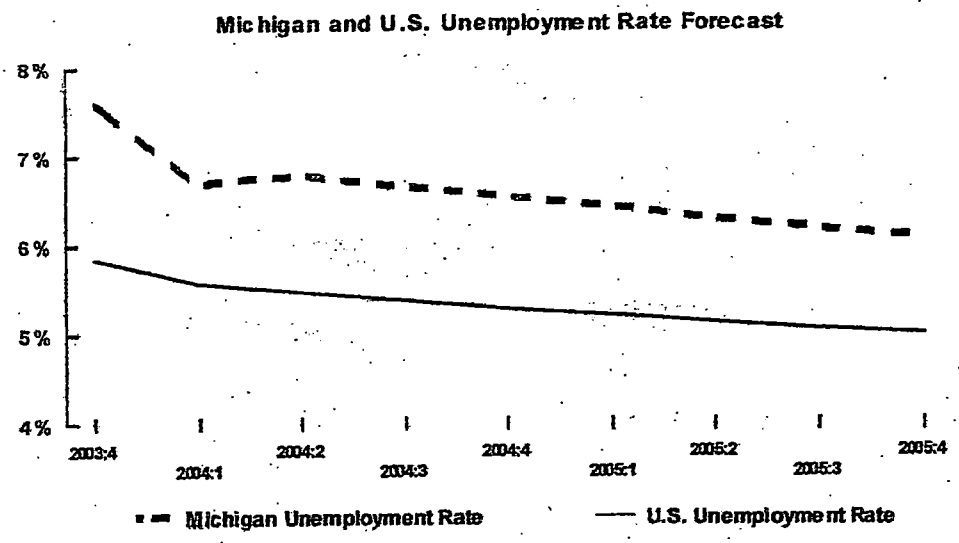
In the national economy, the House Fiscal Agency expects consumer demand, business capital spending, and inventories to contribute to real GDP growth of about 4.6 percent in the first half of 2004.

We expect output to slow somewhat in the second half of 2004 to something less than 4.0 percent. That rate of growth is maintained through the end of 2005 as consumer demand and government spending moderate.

The House Fiscal Agency expects the federal budget to remain expansionary through 2005—but less so than in recent years. Federal expenditures are projected to rise each year, but slow from growing 5.2 percent in FY 2004 to 4.1 percent in FY 2005. Federal receipts are expected to increase only 1.4 percent this year.

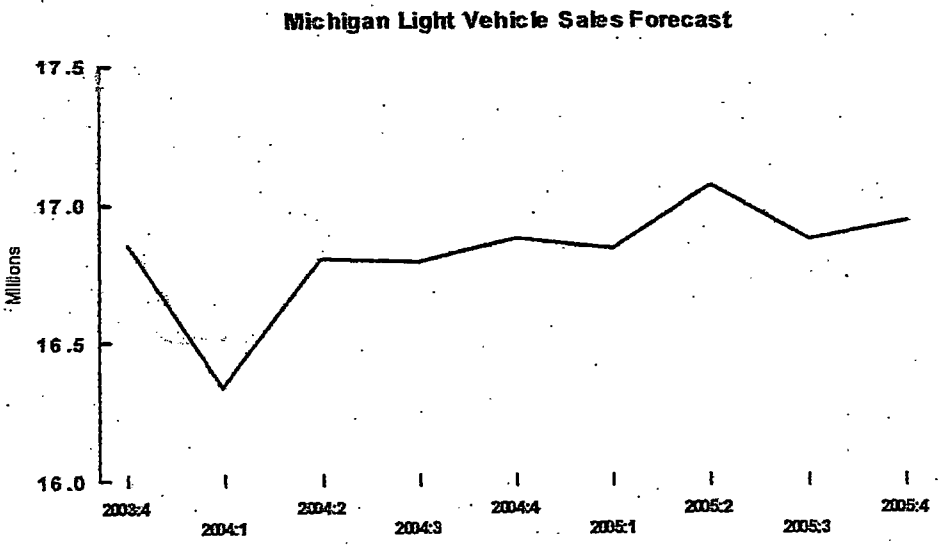
We expect the Federal Reserve to raise the federal funds rate by about 50 basis points this summer, followed by an additional increase of about 25 basis points after the election. We also expect increases of 150 to 175 basis points in 2005.
Increases in the federal funds rate lead to increases in the 3-month Treasury bill rate, which hits about 3 percent by the end of 2005. The 30-year mortgage rate is also expected to increase—to about 5.8 percent in late 2004 and 6.0 percent in late 2005.

As demonstrated in the following graph, U.S. unemployment rates are expected to improve.



The House Fiscal Agency expects modest increases in inflation in 2005.

Light vehicle sales are expected to average 16.7 to 16.9 million units in 2004 and 2005. The exchange value of the dollar is expected to decline somewhat, which slows the loss in the domestic share of light vehicle sales.



We also expect a growing world economy and a relatively weak dollar to stimulate the U.S. market for exports.

OTHER STATES

The recession and an extremely weak recovery in the job market have had a negative impact on state budgets around the country. Fred Giertz, an economist at the Institute of Government and Public affairs, UI Urbana, and Seth Gierth, CBO, analyzed national and state level data for all the states. Their findings are published in the March 2004 National Tax Journal. One of their conclusions was that ". . . states were indeed hit with an unprecedented downturn in revenues—unlike anything that had been experienced in the preceding half century."

These findings are consistent with recent NCSL reports on state revenues and should not be surprising. State revenues are directly impacted by job growth, which has also been weaker in the current recovery.

RISKS

The labor market in Michigan is showing some improvement, but has not yet recovered. If the state labor market does not improve as predicted, the state budget will still be under pressure.

The U.S. economy could be negatively affected by external factors completely beyond the ability of forecasters to predict—such as terrorism or the impact of additional corporate scandals on the equity markets.

STATE BUDGET ISSUES

In recent years, state revenue growth has been particularly weak—and at times negative—while spending pressures have increased. One of the most significant budget problems facing the states is funding Medicaid.

In Michigan, Medicaid is a $7.1 billion program. About 25 percent of General Fund/General Purpose and tens of millions in state restricted revenue are appropriated for Medicaid this year. In four years, Medicaid caseload increased over 27 percent and costs increased over 40 percent. As of December 2003:

- One in eight Michigan residents are receiving Medicaid
- Over one-third of births are paid for by Medicaid
- Over 70 percent of nursing home costs are financed through Medicaid

As we move forward, the biggest risks for the national economy are unpredictable external shocks. The health of the state economy is predicated on the health of the U.S. economy and improvement in the state job market. Barring unpredictable external shocks, we expect the U.S. economy to continue to expand and the state economy to expand this year, but continue to lag the U.S.

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-Occupation Report -Detailed Wages -Detailed Trends -Industry Trends -Customized Report

Occupation Report

Occupation: Central Office and PBX Installers and Repairers
State: Michigan
Typical Educational Level: Post-Secondary vocational training

Description: Test, analyze, and repair telephone or telegraph circuits and equipment at a central office location using test meters and hand tools. Analyze and repair defects in communications equipment on customers' premises using circuit diagrams, polarity probes, meters, and a telephone test set. May install equipment.

Wages and Trends:

Central Office and PBX Installers and Repairers

Wages:

Location	Median, 1998		Midrange, 1998	
	hourly	annual	hourly	annual
United States	$21.00	$43,700	$18.09 -	$37,600 -
Michigan	$20.84	$43,300	$19.45 -	$40,500 -

How to interpret wage data

Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey; Michigan Department of Career Development

Rank this occupation across all states by median wage.

Trends:

Location	Employment		Percent change	Average annual job openings (due to growth and net
	1998	2008		
United States	44,400	58,800	32%	2,880
Michigan	1,700	1,950	16%	80

How to interpret trends

Source: Bureau of Labor Statistics, Office of Employment Projections; Michigan Department of Career Development

Rank this occupation across all states by percent change.

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-Occupation Report -Detailed Wages -Detailed Trends -Industry Trends -Customized Report

Occupation Report

Occupation: Electronics Repairers, Commercial and Industrial Equipment
State: Michigan
Typical Educational Level: Post-Secondary vocational training

Description: Repair electronic equipment such as industrial controls, telemetering and missile control systems, radar systems, transmitters, and antennae, using hand tools and testing instruments. Exclude repairers of data processing equipment and home entertainment equipment.

Wages and Trends:

Electronics Repairers, Commercial and Industrial Equipment

Wages:

Location	Median, 1998		Midrange, 1998	
	hourly	annual	hourly	annual
United States	$17.11	$35,600	$13.37 -	$27,800 -
Michigan	$16.21	$33,700	$12.10	$25,200

How to interpret wage data

Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey; Michigan Department of Career Development

Rank this occupation across all states by median wage.

Trends:

Location	Employment		Percent change	Average annual job openings (due to growth and net
	1998	2008		
United States	71,600	80,600	13%	2,920
Michigan	1,250	1,500	18%	60

How to interpret trends

Source: Bureau of Labor Statistics, Office of Employment Projections; Michigan Department of Career Development

Rank this occupation across all states by percent change.

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-Fastest Growing -Most Openings -Largest Employment -Declining Employment -Highest Paying

Fastest Growing Occupations

Requiring Post-Secondary Training or an Associate's Degree

Listed below are the 25 occupations projected to grow the fastest during the 1998-2008 time period that require post-education or training below the bachelor's degree. Click on an occupation to learn more about it, including state data.

Occupation	Employment		Percent change *
	1998	2008	
Computer Support Specialists	429,300	868,700	102%
Paralegal Personnel	136,000	220,400	62%
Data Processing Equipment Repairers	79,300	116,600	47%
Medical Records Technicians	92,400	132,900	44%
Physical and Corrective Therapy Assistants and Aides	82,100	118,000	44%
Respiratory Therapists	86,400	123,200	43%
Surgical Technologists and Technicians	54,000	76,600	42%
Dental Hygienists	143,300	201,400	41%
Occupational Therapy Assistants and Aides	18,600	26,000	40%
Cardiology Technologists	20,800	29,000	39%
Central Office and PBX Installers and Repairers	44,400	58,800	32%
Emergency Medical Technicians	150,000	197,400	32%
Manicurists	48,900	61,500	26%
Registered Nurses	2,078,800	2,529,700	22%
Licensed Practical Nurses	692,000	828,400	20%
Radiologic Technologists	161,700	194,100	20%
Travel Agents	137,900	163,200	18%
Automotive Mechanics	789,600	921,500	17%
Electrical and Electronic Engineering Technicians and Technologists	334,800	391,100	17%
Radiation Therapists	12,400	14,400	17%
Funeral Directors and Morticians	27,500	32,000	16%
Veterinary Technicians and Technologists	32,000	37,200	16%
Dancers and Choreographers	28,700	32,600	14%

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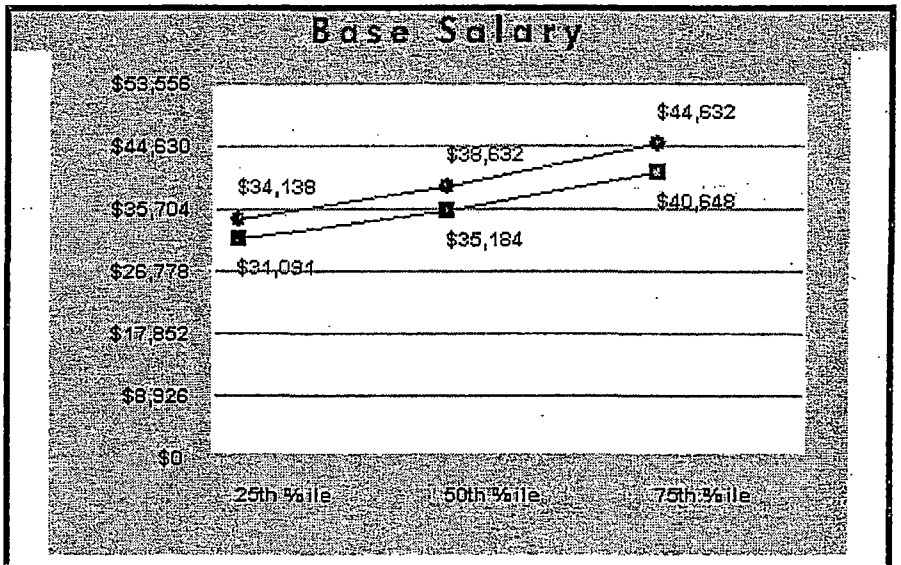
A typical Telecommunications Technician I working in metro Michigan -- Detroit is expected to earn a median base salary of $38,632. Half of the people in this job are expected to earn between $34,138 and $44,632 (i.e., between the 25th and 75th percentiles). These numbers are based on national averages adjusted by geographic salary differentials.
(This data is as of August, 2001)



Telecommunications Technician I	Low	Median	High
●—Michigan -- Detroit	$34,138	$38,632	$44,632
■—the United States	$31,091	$35,184	$40,648

Telecommunications Technician I
Installs, troubleshoots, repairs and maintains telecommunications equipment. Provides reports, completes requests for new service, determines methodology for installing telephone service, determines appropriateness of moderate equipment changes or modifications, call switches, test trunks, test links and installs communication circuits. May require an associate's degree or its equivalent and 0-3 years of experience in the field or in a related area. Has knowledge of commonly-used concepts, practices, and procedures within a particular field. Relies on instructions and pre-established guidelines to perform the functions of the job. Works under immediate supervision. Little creativity is required. Typically reports to a project leader or manager.

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Occupation Report | Detailed Wages | Detailed Trends | Industry Trends | Customized

Occupation Report

Occupation: Telephone and Cable Television Line Installers and Repairers
State: Michigan
Typical Educational Level: Long-term on-the-job training

View career video *download free video software*

Description: String and repair telephone and television cable and other equipment for transmitting messages or TV programming. Duties include locating and repairing defects in existing systems; placing, rearranging, and removing underground or aerial cables; installing supports, insulation, or guy wire systems; and other auxiliary tasks necessary maintain lines and cables.

Wages and Trends:

Telephone and Cable Television Line Installers and Repairers

Wages:

Location	Median, 1998		Midrange, 1998	
	hourly	annual	hourly	annual
United States	$15.75	$32,800	$10.97 - $21.42	$22,800 - $44,600
Michigan	$15.06	$31,300	$11.16 - $20.50	$23,200 - $42,600

How to interpret wage data

Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey; Michigan Department of Career Dev

Rank this occupation across all states by median wage.

Trends:

Location	Employment		Percent change	Average annual job openings (due to growth and net replacement)
	1998	2008		
United States	180,200	234,700	30%	11,310
Michigan	5,700	6,800	18%	290

How to interpret trends

Source: Bureau of Labor Statistics, Office of Employment Projections; Michigan Department of Career Development

Rank this occupation across all states by percent change.

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Knowledge/Skills/Abilities | Tasks/Activities | Education/Training | Web Resources

Knowledge, Skills, and Abilities

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The most important knowledge, skills, and abilities (KSAs) are listed for **Telephone and Cable Television Line Insta Repairers.**

Knowledge:

- ***Telecommunications*** - Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.
- ***Computers and Electronics*** - Knowledge of electric circuit boards, processors, chips, and computer hardware software, including applications and programming.
- ***Engineering and Technology*** - Knowledge of equipment, tools, mechanical devices, and their uses to produce light, power, technology, and other applications.
- ***Mechanical*** - Knowledge of machines and tools, including their designs, uses, benefits, repair, and maintenanc
- ***Mathematics*** - Knowledge of numbers, their operations, and interrelationships including arithmetic, algebra, ge calculus, statistics, and their applications.

Skills:

- ***Installation*** - Installing equipment, machines, wiring, or programs to meet specifications.
- ***Repairing*** - Repairing machines or systems using the needed tools.
- ***Troubleshooting*** - Determining what is causing an operating error and deciding what to do about it.
- ***Equipment Maintenance*** - Performing routine maintenance and determining when and what kind of maintenan needed.
- ***Problem Identification*** - Identifying the nature of problems.
- ***Testing*** - Conducting tests to determine whether equipment, software, or procedures are operating as expected

Abilities:

- ***Manual Dexterity*** - The ability to quickly make coordinated movements of one hand, a hand together with its ar hands to grasp, manipulate, or assemble objects.
- ***Control Precision*** - The ability to quickly and repeatedly make precise adjustments in moving the controls of a or vehicle to exact positions.
- ***Oral Comprehension*** - The ability to listen to and understand information and ideas presented through spoken and sentences.
- ***Deductive Reasoning*** - The ability to apply general rules to specific problems to come up with logical answers

involves deciding if an answer makes sense.

- ***Information Ordering*** - The ability to correctly follow a given rule or set of rules in order to arrange things or ac certain order. The things or actions can include numbers, letters, words, pictures, procedures, sentences, and mathematical or logical operations.
- ***Near Vision*** - The ability to see details of objects at a close range (within a few feet of the observer).
- ***Oral Expression*** - The ability to communicate information and ideas in speaking so others will understand.

Need to find a course to increase your knowledge, skills, or abilities? Try finding a course in America's Learning eXcha

Source: Occupational Information Network, 1998 O*NET

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Occupations with the Most Openings

Requiring Post-Secondary Training or an Associate's Degree

Listed below are the 25 occupations with the largest number of projected openings during the 1998-2008 time period t require post-secondary education or training below a bachelor's degree. Click on an occupation to learn more about it, state data.

Occupation	1998 Employment	Average annual job open (due to growth and ne replacements)
Registered Nurses	2,078,800	79,400
Computer Support Specialists	429,300	46,600
Automotive Mechanics	789,600	32,820
Licensed Practical Nurses	692,000	28,450
Hairdressers, Hairstylists, and Cosmetologists	605,200	21,770
Electrical and Electronic Engineering Technicians and Technologists	334,800	12,470
Paralegal Personnel	136,000	9,580
Dental Hygienists	143,300	9,030
Emergency Medical Technicians	150,000	8,450
Legal Secretaries	285,100	8,350
Sales Agents, Real Estate	284,600	8,310
Medical Records Technicians	92,400	6,340
Medical Secretaries	219,300	6,220
Physical and Corrective Therapy Assistants and Aides	82,100	5,620
Radiologic Technologists	161,700	5,490
Travel Agents	137,900	5,440
Respiratory Therapists	86,400	4,970
Data Processing Equipment Repairers	79,300	4,860
Surgical Technologists and Technicians	54,000	3,600
Photographers	149,400	3,360
Electronics Repairers, Commercial and Industrial Equipment	71,600	2,920
Central Office and PBX Installers and Repairers	44,400	2,880
Stenographers and/or Court Reporters	110,000	2,860
Manicurists	48,900	2,530
Psychiatric Technicians	66,000	1,640

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Fastest Growing Occupations

Requiring Post-Secondary Training or an Associate's Degree

Listed below are the 25 occupations projected to grow the fastest during the 1998-2008 time period that require post-s education or training below the bachelor's degree. Click on an occupation to learn more about it, including state data.

Occupation	Employment		Percent c	
	1998	2008		
Computer Support Specialists	429,300	868,700	102%	10
Paralegal Personnel	136,000	220,400		6
Data Processing Equipment Repairers	79,300	116,600	47%	4
Medical Records Technicians	92,400	132,900		4
Physical and Corrective Therapy Assistants and Aides	82,100	118,000		4
Respiratory Therapists	86,400	123,200		4
Surgical Technologists and Technicians	54,000	76,600		4
Dental Hygienists	143,300	201,400		4
Occupational Therapy Assistants and Aides	18,600	26,000		4
Cardiology Technologists	20,800	29,000		3
Central Office and PBX Installers and Repairers	44,400	58,800		3
Emergency Medical Technicians	150,000	197,400		3
Manicurists	48,900	61,500		2
Registered Nurses	2,078,800	2,529,700		2
Licensed Practical Nurses	692,000	828,400		2
Radiologic Technologists	161,700	194,100		2
Travel Agents	137,900	163,200		1
Automotive Mechanics	789,600	921,500		1
Electrical and Electronic Engineering Technicians and Technologists	334,800	391,100	17%	1
Radiation Therapists	12,400	14,400		1
Funeral Directors and Morticians	27,500	32,000		1
Veterinary Technicians and Technologists	32,000	37,200		1
Dancers and Choreographers	28,700	32,600		1
Electronics Repairers, Commercial and Industrial Equipment	71,600	80,600	13%	1
Legal Secretaries	285,100	322,000		1

* ***Note:*** *The national average percent change is 14%.*

Source: Bureau of Labor Statistics, Office of Employment Projections

AREAS	EMPLOYERS	DESCRIPTIONS/STRATEGIES
CIVIL Structural Urban and Community Planning Construction Environmental Water Resources Transportation and Pipeline Geotechnical Photogrammetry, Surveying and Mapping Materials	Construction industry Engineering or architectural firms Utility companies Oil companies Telecommunications businesses Manufacturing companies Consulting firms Railroads	***Broad discipline of "doers" providing service to the community through development and improvement. Works extensively with other professionals involved with the community. Provides opportunity to work out doors.*** Learn to work well within a team. Develop strong communication and interpersonal skills. Develop physical stamina for outdoor work. Get experience in organizing and directing workers and materials. Ability to visualize objects in three dimensions helpful. Demand has remained steady due to broad nature of discipline. States may require licensing/registration.
ELECTRICAL/ELECTRONIC Power Electronics Power Systems Communications Electronics Control Systems Digital Signal Processing Microelectronics Image Processing & Robotics Computer Engineering Plasma Engineering Computer Vision	Manufacturing firms and industry including: Aeronautical/Aerospace Automotive Business machines Professional and scientific equipment Consumer products Chemical and petrochemical Computers Construction Defense Electric utilities Electronics Environmental Food and beverage Glass, ceramics and metals Machine tools	***A field in touch with a wide and growing range of applications such as the "information highway," exploration of outer space, and a revolution in medical diagnosis and treatment.*** Develop effective verbal and written communication skills. Get experience in working as part of a team. Acquire capacity for details. Develop interpersonal skills. Get involved in research.

AREAS	EMPLOYERS	DESCRIPTIONS/STRATEGIES
	Electrical/Electronic, Continued Mining and metallurgy Nuclear Oceanography Pulp and paper Textiles Transportation Water and wastewater Public utilities Federal government including: Armed forces National Aeronautics and Space Administration (NASA) National Institutes of Health Bureau of Standards Department of Defense Various commissions Consulting firms Free-lance consulting	
INDUSTRIAL Operations Research Applied Behavioral Science Systems Manufacturing Management	Manufacturing industries Accounting firms Retail distribution organizations Banks and finance organizations Hospitals and healthcare organizations Educational and public service agencies Transportation industries Construction industries Public utilities Electrical and electronics machinery industries Consulting firms	***Discipline links management and operations by improving productivity through a "big picture" approach; serves human needs and works with people.*** Take courses in psychology, sociology and anthropology. Earn MBA or Ph.D. for advancement in management/administration.

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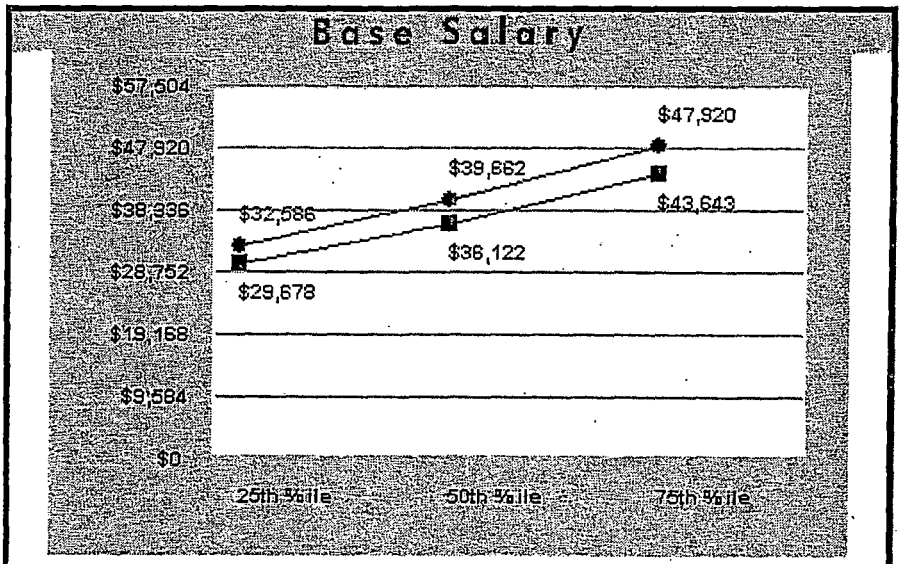
Salary Wizard

A typical Electrical Utility Trouble Shooter working in metro Michigan -- Detroit is expected to earn a median base salary of $39,662. Half of the people in this job are expected to earn between $32,586 and $47,920 (i.e., between the 25th and 75th percentiles). These numbers are based on national averages adjusted by geographic salary differentials.
(This data is as of August, 2001)



Electrical Utility Trouble Shooter	Low	Median	High
Michigan -- Detroit	$32,586	$39,662	$47,920
the United States	$29,678	$36,122	$43,643

Electrical Utility Trouble Shooter
Installs, tests, troubleshoots, and repairs electrical utility equipment. Requires a high school diploma or its equivalent. May be required to be certified in an area of specialty with 2-4 years of experience in the field or in a related area. Familiar with standard concepts, practices, and procedures within a particular field. Relies on limited experience and judgment to plan and accomplish goals. Performs a variety of tasks. Works under general supervision. A certain degree of creativity and latitude is required. Typically reports to a supervisor/manager.

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A typical Telecommunications Engineer I working in metro Michigan -- Detroit is expected to earn a median base salary of $43,418. Half of the people in this job are expected to earn between $39,627 and $48,127 (i.e., between the 25th and 75th percentiles). These numbers are based on national averages adjusted by geographic salary differentials.

(This data is as of August, 2001) Employers: your job posting could be here.

Base salary | Total cash compensation

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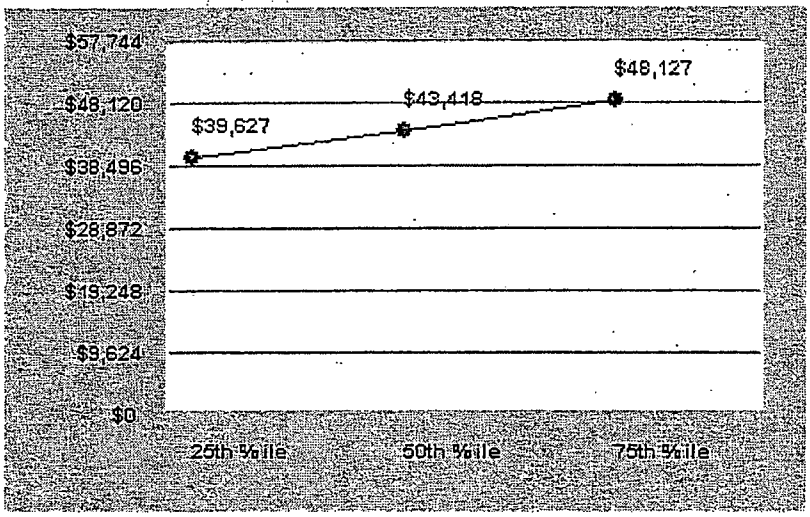

Telecommunications Engineer I	Low	Median	High
Michigan -- Detroit	$39,627	$43,418	$48,127

Update - July 2001 Why have some market salaries gone down?

new! One-click job search

Click on the logos to go directly to job openings for Telecommunications Engineer I in your area.

CareerJournal.com | NetTemps | USJobBoard

Telecommunications Engineer I

Analyzes telecommunications functions of organizations. Works to develop, improve, maintain, and implement network. May require a bachelor's degree in area of specialty and 0-2 years of

Related jobs

Telecommunications Engineer I openings in Michigan -- Detroit:

Career Journal
Hotjobs
Headhunter

Job Finder

Job seeke

Enter job title/keyword(s)

Go

Advanced search

Resume Center

Job seeke

Post a resume
Resume writing tips
Business correspondence tips

Candidate Finder

Employe

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experience in the field or in a related area. Has knowledge of commonly-used concepts, practices, and procedures within a particular field. Relies on instructions and pre-established guidelines to perform the functions of the job. Works under immediate supervision. Typically reports to a supervisor or manager.

Compare Telecommunications Engineer I working in Michigan -- Detroit to...

1. The U.S. national average for Telecommunications Engineer I Go

2. The same job in a different location choose location Go

3. A related job (Michigan -- Detroit) choose related job Go

Related jobs: (create salary report for job title)

Aerospace Engineer I
Aerospace Engineer II
Aerospace Engineer III
Airport Engineer
Ceramics Engineer
Ceramics Engineer, Sr
Chemical Engineer I
Chemical Engineer II
Chemical Engineer III
Civil Engineer I
Civil Engineer II
Civil Engineer III
Director Engineer
Electrical Controls Engineer I
Electrical Controls Engineer II
Electrical Controls Engineer III
Electrical Engineer I
Electrical Engineer II
Electrical Engineer III
Engineering Aide I
Engineering Aide II
Engineering Aide III
Environmental Engineer
Environmental Engineer, Sr
Hardware Engineer I
Hardware Engineer II
Hardware Engineer III
Industrial Engineer I
Industrial Engineer II
Industrial Engineer III
Industrial Engineering Manager
Industrial Engineering Technician I
Industrial Engineering Technician II
Industrial Engineering Technician III
Manager Engineering
Manufacturing Engineer I
Manufacturing Engineer II
Manufacturing Engineer III
Materials Engineer I
Materials Engineer II
Materials Engineer III
Mathematical Technician
Mechanical Engineer I
Mechanical Engineer II
Mechanical Engineer III
Nuclear Engineer I
Nuclear Engineer II
Nuclear Engineer III
Petroleum Engineer I
Petroleum Engineer II
Petroleum Engineer III
Production Engineer I
Production Engineer II
Production Engineer III
Project Manager - Engineer
Quality Assurance Engineer I
Quality Assurance Engineer II
Quality Assurance Engineer III
Reliability Engineer I
Reliability Engineer II
Reliability Engineer III
Sales Engineer
Service Engineer I
Service Engineer II

Computer Hardware Engineering

Associate in Applied Science
Auburn Hills

Current Program

Major Requirements			Credits
CIS 1050		Personal Computer Productivity Tools	4
ECT 2080	*	Introduction to Microcontrollers	4
ECT 2150	*	Computer Repair I	4
ECT 2160	*	Computer Repair II	4
EEC 1020	*	DC Fundamentals	3
EEC 1040	*	AC Fundamentals	3
EEC 1050	*	DC and AC - Circuit Analysis	3
EEC 1350	*	Digital Logic	3
			28

Required Supportive Courses			
		and PCB Layout	3
ENG 1450[2]	*	Writing and Reading for Problem Solving	3
ENG 2200	*	Professional Communication	4
or			
MAT 1630	*	College Algebra and Trigonometry	4
			14-17

Additional General Education Credits	**10**
Total Credits Earned	**59-62**
Necessary Electives to Total	**62**

Proposed Replacements for EEC & ELT Courses

Major Requirements			Credits
CIS 1050		Personal Computer Productivity Tools	4
CIS 1305	*	Cisco Internetworking I	4
CIS 1310	*	Cisco Internetworking II	4
ECT 2080	*	Introduction to Microcontrollers	4
ECT 2150	*	Computer Repair I	4
ECT 2160	*	Computer Repair II	4
EEC 1050	*	DC and AC - Circuit Analysis	3
EEC 1350	*	Digital Logic	3
			30

Required Supportive Courses			
ENG 1450[2]	*	Writing and Reading for Problem Solving	3
ENG 2200	*	Professional Communication	4
MAT 1150	*	Ellementary Algebra	4
MAT 1630	*	College Algebra and Trigonometry	4
			15-18

Additional General Education Credits	**10**
Total Credits Earned	**58-62**
Necessary Electives to Total	**62**

OAKLAND COMMUNITY COLLEGE

CURRICULUM REVIEW SELF-STUDY
Recommendations

Program/Discipline: CHT (Computer Hardware Engineering Technology) Coordinator(s): Bob Powell

Review Date: March 17, 2006 Today's Date: March 20, 2006

In an effort to provide meaningful feedback to the program coordinator and related faculty, specific recommendations resulting from your program/discipline Curriculum Review are as follows:

CHT (Computer Hardware Engineering Technology) – presented by Bob Powell
Review Recommendations: (Review –March 17, 2006)

- CRC recommends that the four courses for CISCO (CIS 1305, CIS 1310, CIS 1320, and CIS 1330) be taken to the College Curriculum Committee for recommendation to become a Certificate of Achievement under Computer Information System.
- CRC recommends that revision to the CHT program which includes CISCO, CHT courses, and A+ and Net + courses be taken to the College Curriculum Committee.
- CRC recommends the CHT program be renamed to better indicate industry's marketplace.
- CRC recommends once the revised CHT program has had a 2 year sequencing (Fall 2008), the faculty coordinator return for another CRC review.
- CRC recommends CHT to revisit the need to meet regularly with the designated advisory board.

In order to continue refining the process of Curriculum Review, the committee would appreciate an update on your process regarding the above recommendations by the end of Fall 2006 semester, and any suggestions regarding the review process.

The review for CHT presented a vision of a program needing revision to be current with the marketplace. CRC supports your continued success in curriculum revision and development, and CHT program growth.

Respectfully submitted,

Gail A. Mays
Chair of the Curriculum Review Committee