

**School of Engineering and Computer Science
Oakland University
Rochester, Michigan 48309**

Skills Re-building / Professional Development Programs

Owing to the current tough economic situation in Michigan, Oakland University is acutely aware of the needs of the displaced workforce. The University has taken the following initiatives in order to alleviate the challenges that are faced by the displaced workers:

1. All of the regular degree programs in engineering/computing, of the School of Engineering and Computer Science, have been approved by the Michigan Works for posting on its website. If you are interested in any of the programs listed, you may be eligible to receive financial support from Michigan Works. The following link will be helpful www.mycareereducation.org
2. Oakland University has created a special Financial Assistant Fund for students. Please contact www.oakland.edu/financialaid, call 248.370.2550 or email finaid@oakland.edu
3. The School of Engineering and Computer Science (SECS) has created the following programs.
 - (i) **Skills Rebuilding Programs:**
These are certificate programs oriented toward building or rebuilding skills in various relevant aspects of engineering and/or computing. Through such certificate programs, the displaced workers could add to their existing portfolio and improve their marketability.
 - (ii) **Professional Development Programs:**
These are also certificate Programs based on existing graduate level courses within the SECS. These programs are oriented toward specialized skills enhancement. The courses under this program could transfer to a relevant graduate program should the person decide to pursue a regular program of study, subsequently.

Usually a bachelor's degree and relevant background is required for these programs. A listing of the above programs is given below:

SKILLS REBUILDING PROGRAMS

To download registration form go to www.oakland.edu/secs

1. Computer Science

According to studies done by several IT staffing and consultancy firms, the companies are looking to hire employees with skills in areas of networking and system administration, database management, web development and deployment, and software project and quality management. Accordingly, the Department of Computer Science and Engineering is pleased to offer the following skills rebuilding programs:

CSE 201 Networking and System Administration (120 hours of instruction)

A solid understanding of computer networking concepts and practices is essential for a successful career in information technology. This course is designed to impart you with a working knowledge of networking fundamentals, routers and switches, networking protocols, and firewalls and security. You will also learn about scripting languages for Linux and Windows systems and how to administer networks of computers running Linux and Windows. The lectures will be supplemented with laboratory exercises to give you a hands-on experience to gain a better understanding of the networking and system administration concepts

CSE 202 Information System Design and Development (120 hours of instruction)

This course is designed to give you skills needed for creating, deploying and managing web-based information systems. You will learn about web application fundamentals and a variety of tools to create and manage interactive web information systems. You will learn about different server side technologies such as IIS, LAMP/AMP, and JBOSS, scripting languages such as PHP and Ruby on Rail, and Adobe Flash/Flex to create rich interactive websites. The lectures will be supplemented with laboratory exercises to give you a hands-on experience with different technologies and concepts.

CSE 203 Software Project & Quality Management (120 hours of instruction)

This course is designed to impart you a solid foundation for software project management and quality assurance. You will learn about different topics as they pertain to managing different aspects of managing a large software development including modeling via UML, software design patterns, software process improvement and quality assurance. Case studies from several real life software project management and quality assurance will be presented.

2. **Computer Engineering:** The following three tracks are available

ECE 201 Learn to Program the HCS12 Microcontroller Using Code Warrior (24 hours of instruction)

Monster.com shows that many jobs are currently available in Michigan in the field of embedded systems.

This short course will show how to program the HCS12 microcontroller on the DRAGON 12-Plus board in both C and assembly language using the industry-standard Code Warrior environment.

The course will be offered in two formats:

- (i) Three consecutive 8 –hour days
- (ii) Four consecutive 6-hour Saturdays

ECE 202 Learn to create Hardware using VHDL on Spartan 3E FPGA (24 hours of instruction)

Monster.com shows that many jobs are currently available in Michigan in the field of embedded systems.

This short course will show how to program the Spartan 3E FPGA on the BASYS board from Digilent, Inc. in VHDL using the industry-standard Aldec Active-HDL environment.

The course will be offered in two formats:

- (i) Three consecutive 8 –hour days
- (ii) Four consecutive 6-hour Saturdays

ECE 203 Learn to create Hardware Using Verilog on a Spartan 3E FPGA (24 hours of instruction)

Monster.com shows that many jobs are currently available in Michigan in the field of embedded systems.

This short course will show how to program the Spartan 3E FPGA on BASYS board from Digilent, Inc. in Verilog using the industry-standard Aldec Active-HDL environment.

The course will be offered in two formats:

- (i) Three consecutive 8 –hour days
- (ii) Four consecutive 6-hour Saturdays

3. **Mechanical Engineering**

ME 301 Computer-Aided Design and Applications (56 hours of instruction)

Topics to be covered include the principles of engineering graphics, techniques of creating three-dimensional parts, sketch tools, basics of surface design, generation of projection views and their dimensions, assembly design, and basics of mechanism of kinematic chains. The computer-aided engineering software CATIA will be used throughout.

This course will be offered in the two formats:

- (i) Seven consecutive 8-hour days
- (ii) Seven consecutive 8-hour Saturdays

ME 401 Computational Methods in Mechanical Engineering (48 hours of instruction)

The goal of this course is to introduce a variety of numerical analysis methods used to solve problems in mechanical engineering. Techniques to be discussed include the solution of roots of equations, direct and iterative solution methods for systems of equations, curve-fitting, optimization, finite-difference methods and the solution of ordinary differential equations, Emphasis will be on the application of these techniques using Matlab. Examples will be drawn from a variety of mechanical engineering topics, including heat transfer, vibrations, dynamics, fluid mechanics and stress analysis.

This course will be offered in the two formats:

- (i) Six consecutive 8-hour days

4. **Robotics**

ECE 204 Applied Programmable Logic Controllers Programming (32 hours of instruction)

Learn to perform programming of industrial PLCs. This short course will cover PLC configuration, input/output setup, planning and creating a program, program elements, testing and running a program, and program and file manipulation. upon completion, you will be able to pursue employment as a PLC programmer in such industries as automotive, wastewater, bottling, aerospace, and defense.

This course will be offered in two formats:

- (i) Four consecutive 8-hour days
- (ii) Four consecutive 8-hour Saturdays
- (iii)

ECE 205 Industrial Automated Controls Design (48 hours of instruction)

Learn to perform Industrial Automated Controls Engineering. This course will cover pneumatic design topics such as sequencing, pipe sizing, and valve theory, fluid power design topics including water and hydraulic basics, and electrical design topics with a focus on industrial control circuits. Upon completion, you will be able to pursue employment as a Controls Designer in such industries as automotive, aerospace, defense, and healthcare. The Controls Engineer is

responsible for implementation, testing and support of electrical controls for manufacturing machining and assembly systems and equipment.

This course will be offered in two formats:

- (i) Six consecutive 8-hour days
- (ii) Eight consecutive 6-hour Saturdays

ISE 504 PLM Workforce Development Program (160 hours of instruction)

Introduce engineers to the concept of Product Lifecycle Management (PLM) and, in particular, directly build skills in Dassault Systemes Digital Manufacturing Lifecycle tools. The course is divided into two sections that will run concurrently. The first section will cover foundations of PLM and the second section will consist of hands-on training in several of Dassault Systemes DELMIA software tools. The hands-on training section of the course will be taught by Dassault Systemes at their training facility located adjacent to the O.U. campus.

This course will be offered in the following format:

8 hours per day, 5 days per week for 4 consecutive weeks

PROFESSIONAL DEVELOPMENT PROGRAMS

To apply contact Graduate Admissions at www.oakland.edu/grad/gradadmiss/pages

The courses listed under each of the following programs are, generally, regular graduate offerings of the SECS. These courses involve semester long instruction, and are transferable to the relevant, regular graduate programs offered by the SECS.

1. Program in Embedded Systems:

From consumer electronics to industrial machinery and automotive computers, the engineers that design embedded systems are working in a fiercely competitive global market. While competitive pressure to get products to market faster continues to increase, embedded system designs are growing more complex and taking longer to complete. New design techniques continue to evolve at a high rate to improve the tools for embedded system design.

Two sequences are available:

- a) Basic Sequence (12 credit hours)
 - ECE 508 (4 crs) - Digital Logic and Microprocessor Design
 - ECE 5xx (2 crs) - Embedded C Programming
 - ECE 5xx (2 crs) - Use of Embedded Systems Development Tools
 - ECE 570 (4 crs) - Microprocessor-based System Design
- b) Advanced Sequence (16 credit hours)
 - ECE 666 (4 crs) - Real-time Computing Systems
 - ECE 571 (4 crs) – Mixed Signal Embedded Systems
 - ECE 671 (4 crs) - DSP in Embedded Systems
 - ECE 576 (4 crs) - Embedded System Design with FPGA's

For more details go to: www.oakland.edu/secs

2. Program in Mechatronics

Mechatronics refers to a flexible, multi-disciplinary approach of solving engineering design problems through integration of Electrical, Computer, Mechanical Engineering, and Information Sciences. Over the past decade, it has emerged as an essential tool for the design of intelligent products and systems.

The following courses are required: (12 credit hours)

- ECE 575 (4 crs) - Automotive Mechatronics

Any two courses from the following:

- ECE 570 (4crs) - Microprocessor-Based System Design
- ECE 571 (4 crs) - Mixed Signal Embedded Systems
- ECE 572 (4 crs) - Microprocessor-Based Control Systems
- ECE 678 (4 crs) - Introduction to Autonomous Vehicle Systems

For more details go to: www.oakland.edu/secs

3. Programs in Mechanical Engineering

A. Alternative Energy (12 credit hours)

The alternative energy issues have gained substantial importance lately. This certificate program will focus on the following aspects:

- ME 537 (4 crs) - Fundamental of Fuel Cells

ME 554 (4 crs) - Solar and Alternate Energy Systems
ME 595 (4 crs) - Energy Storage Systems for Hybrid Electric Vehicles

For more details go to: www.oakland.edu/secs

B. Polymer Engineering (12 credit hours)

The focus of this certificate program is on the following aspects:

ME 543 (4 crs) - Polymeric Materials
ME 544 (4 crs) - Plastics Processing Engineering
ME 595 (4 crs) - Polymer Nano-technology

For more details go to: www.oakland.edu

4. Program in Industrial Engineering (12 credit hours)

From manufacturing to health care, industrial engineering techniques allow improved efficiency and use of scarce resources. This certificate is designed to review the fundamentals of Industrial Engineering so that students that have graduated some time ago acquire the background to enter a Masters Degree Program in Industrial Engineering.

This is accomplished by their taking the following courses:

ISE 501

Practical Application of Quantitative Methods in Industrial Engineering (4 Credits)

Use of calculus and linear algebra based methods to estimate marginal cost of production, economic batch size in batch production, carry out break-even analysis to competing manufacturing processes, identification of optimal system configuration to minimize material handling efforts, estimation of optimal load for repetitive manual task, estimation of learning curve parameter, and similar applications. Credit not applicable toward an M.S. degree.

ISE 502

Introduction to Statistical Methods and Operations Research (4 Credits)

Review of discrete and continuous probability distributions, sampling distributions, parameter estimation and testing of hypotheses, simple and multiple linear regression and introduction to design of experiments. Theory and application of linear programming, duality theory, integer programming, network analysis, non-linear programming, Lagrange multipliers and Kuhn-Tucker conditions, dynamic programming and queuing theory, includes discussion on solution of real world applications. Credit not applicable toward an M.S. degree.

ISE 503

Introduction to Industrial Engineering (4 Credits)

Work measurement, work design and methods improvement applied to manufacturing and services systems. Topics include human performance analysis, work sampling and learning curves. Manual and cognitive work design, hand tool design, work environment design, etc. Analysis of time valued investments and the effects of depreciation and taxes on comparing alternatives. Analysis, planning and design of physical facilities utilizing operations research, engineering and economic principles. Credit not applicable toward an M.S. degree

For more details go to: www.oakland.edu

5. Program in Industrial Automated Controls (12 credit hours)

SYS5XX	Applied Robot Programming	(4 credits)
ECE5XX	Applied PLC Programming	(4 credits)
ECE5XX	Industrial Automated Controls Design	(4 credits)

Industrial controls refers to the discipline of utilizing electrical, pneumatic, hydraulic, robotic, and computer / PLC components within an automated system to achieve a certain goal. This program will focus on the necessary skills needed to design and integrate various automated tooling equipment. It will be more intensive and hands-on covering more of the advanced topics, whereas the skills development program listed above will still cover the basics, but not the more advanced applications.

For more details go to: www.oakland.edu

For more information, call the Office of the Dean, School of Engineering and Computer Science at (248)370.2233 or 370.2217