

Embedded Systems

Embedded systems are computers inside other machines. Automobile entertainment systems, robots, and even microwave ovens are examples of embedded systems. Creating embedded systems requires knowledge of both hardware design and software programming.

Embedded systems are ubiquitous, yet only one other university in Michigan offers a program of study in embedded systems.

Industries that utilize embedded systems engineers include defense, robotics, communications, consumer electronics, and aeronautics.

Skills and Competencies

This program is a hybrid. It is designed to teach students both how to design and build computer controlled machines, and how to program the resulting devices. The Electronics Technologies classes fulfill the first objective, and the Computer Science classes fulfill the second objective.

Where are these applicable:

- Industrial Machines, automobiles, medical equipment, space, cameras, household appliances, agriculture, airplanes, vending machines, cellular phone, PDA, toys.
- Automotive embedded including robotics; Healthcare devices; Telecommunications (Mobiles, 2G, 3G, 4G, LTE, Data Communications); Satellite communications; Avionics (Aeroplanes); Testing and Measurement Sub Domains

Course Work

This degree includes the following courses as part of the program requirements, and specific major requirements along with general education and graduation requirements.

Engineering Technology Core

- ET112 DC Circuit Analysis (4 cr.)**
- ET113 AC Circuit Analysis (4 cr.)**
- ET210 Discrete Semiconductors (4 cr.)**
- ET211 Digital Electronics (4 cr.)**
- ET212 Advanced Linear Circuits (3 cr.)**
- ET321 Embedded Systems Programming (4 cr.)**
- ET415 Controls (3 cr.)**
- ET420 Microcontroller Applications (3 cr.)**
- ET431 Senior Project I (1 cr.)**
- ET432 Senior Project II (2 cr.)**

Computer Science Core

- CS120 Computer Science I (4 cr.)**
- CS122 Computer Science II (4 cr.)**
- CS201 Programming in C++ (3 cr.)**
- CS222 Data Structures (4 cr.)**
- CS228 Network Programming (3 cr.)**
- CS330 Microcomputer Architecture (4 cr.)**
- CS422 Algorithms Design and Analysis (3 cr.)**
- CS426 Operating Systems (4 cr.)**

Major Electives

Choose a minimum of seven credits:

- CS Electives (not including CS101)**
- ET Electives (not including ET101 or ET110)**
- MA115 Precalculus or above (4 cr.)**

Other Required Courses

- MA161 Calculus I (4 cr.)**

Detailed course descriptions can be found at www.nmu.edu/bulletin.

Career Development

You should begin the resume-building process as soon as you can. The Academic and Career Advise-ment Center can assist you with career planning, while Career Services will help you fine tune your resume and look for jobs related to your field. In the meantime, the more hands-on experience you have, the better you prepare for employment. Becoming involved in a professional related internship is a way to develop your professional skills and gain experience. Your academic course work is important as well, so be sure to maintain a high grade point average.

Additional Considerations

This is a new interdisciplinary program using existing classes from the computer Science and Electronics Technologies programs, and finish with a new capstone course.

Internship experience and organizational affiliations are beneficial to persons interested in pursuing any number of professional careers related to Embedded Systems.

Job Outlook

The U.S. Labor Department projects a 4% growth in the need for electronic engineers, and a 22% growth in the need for programmers. They also report that hardware engineers have a median salary of \$90,000, and software engineers \$102,000. The Intel Corporation (our biggest internship sponsor) has asked for more students with this skill set.

Potential Careers

NMU's Embedded Systems Program prepares students for employment in the following careers:

- Embedded Software Engineers
 - System software engineer (Kernel and RTOS)
 - Application software engineer (Device Drivers)
- Software test engineer
- Driver Development - Linux
- GPS/AGPS Developer
- RF / WiFi / Communications Protocol Engineer
- Embedded Hardware Engineers
 - Hardware engineer
 - Board Design Engineer
 - Board (hardware) validation engineer
 - Application Engineers
 - Application Engineer Technical Support
 - Tech Support Engineer
 - Product Application Engineer (PAE)
- Marketing and Sales
 - Marketing executive
 - Sales executive

Additional Resources and Information

For Career Planning and Opportunities:
Academic & Career Advisement Center
3302.1 C.B. Hedgcock
906-227-2971
www.nmu.edu/acac

Mathematics and Computer Science Department
2200 Jamrich Hall
906-227-2020
www.nmu.edu/math

For Job Search, Resume and Career Information:
Career Services
3302.3 C.B. Hedgcock
906-227-2800
www.nmu.edu/careers

For Information about NMU Student Organizations Associated with this Major Contact:
Center for Student Enrichment
1206 University Center
906-227-2439
www.nmu.edu/cse

Association for Computing Machinery
<http://csc.nmu.edu> (acm@nmu.edu)
Facebook: NMU Computer Science
NMU ACM

NMU Robotics Club
Facebook: NMU Robotics (jhorn@nmu.edu)

Internet Resource Links:
www.careers.org
www.careerresource.net
www.bls.gov

For Career Information with National Organizations:
www.cra.org -Computing Research Association
www.acm.org -The Association for Computing Machinery



**NORTHERN MICHIGAN
UNIVERSITY**

MARQUETTE, MICHIGAN

The Academic & Career Advisement Center
2020



What to do with
a major in...

Embedded Systems

