

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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**Special instructor:** *Jerry E. Marsh*

**Special lecturer:** *Laura Dinsmoor, Sebnem Onsay*

## Advisory Board

The Computer Science and Engineering Advisory Board assists the department in enhancing its educational and research programs and ensuring their relevance to current and emerging technological needs. Board members are:

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*Lawrence C. Webner, Director, Emerging Markets, Electronic Data Corporation*

*Donald J. Welch, Ph.D., President and CEO, Merit Network, Inc.*

## Mission

The Department of Computer Science and Engineering carries out the mission of the School of Engineering and Computer Science by offering separate undergraduate majors in Computer Science and Information Technology. The department also offers masters programs in Computer Science, Software Engineering and Information Technology, and a doctoral program in Computer Science and Informatics.

## Major in computer science

The program in computer science leading to a Bachelor of Science degree prepares students for professional practice in systems programming, software design and computer applications, or for graduate study in computer science. The program provides a solid foundation based on the organization, processing and display of information.

### Program Educational Objectives

The objectives of the Computer Science program are to produce graduates who:

- are able to design, implement, verify and test a computer software system;
- can adapt and contribute to new technologies and methods and to use these in the practice of computer science;
- are prepared to pursue successfully graduate study in computer science or related disciplines;
- are proficient in written and oral communication;
- can function successfully in the automotive and other global industries;
- can serve in a variety of roles such as solving problems with technical and nontechnical elements, serving as team members, and leading others; and
- have high standards of professional and ethical responsibility.

To earn the Bachelor of Science degree with a major in computer science students must complete a minimum of 128 credits, satisfy writing requirements (also see *Undergraduate degree requirements*) and meet the following requirements:

	<b>Credits</b>
<b>General education</b>	<b>24</b>
<b>Mathematics and science</b>	
MTH154-155    Calculus	8
MTH 275        Linear Algebra	4
APM 263        Discrete Mathematics	4
PHY 151-152    Introductory Physics	8
STA 226        Applied Probability and Statistics	4
Approved mathematics or science elective*	<u>4</u>
	32
<b>Computer science core</b>	
CSE 142        Introduction to C Programming and Unix	2
EGR 240        Introduction to Electrical and Computer Engineering	4
CSE 230        Object-Oriented Computing I	4
CSE 231        Object-Oriented Computing II	4
CSE 280        Sophomore Project	2
CSE 364        Computer Organization	<u>4</u>
	20
<b>Professional subjects</b>	
<b>Required:</b>	
200-Level CSE Programming elective (CSE 232 or 233 or 234 or 235)	2
200-Level Professional elective (CSE 220 or 247 or 252)	4
CSE 335        Programming Languages	4
CSE 337        Software Engineering and Practice	4
CSE 343        Theory of Computation	4
CSE 345        Database Design and Implementation	4
CSE 361        Design and Analysis of Algorithms	4
CSE 402        Social Implications of Computers	2
CSE 450        Operating Systems	4
CSE 480        Senior Capstone Project	<u>4</u>
	36
<b>Electives —</b>	
<b>Professional electives: 8 credits chosen from:</b>	<b>8</b>

Any 300-, 400-, or 500-level engineering or computer science or information technology courses, or approved mathematics and science electives (see below)\*

**Free electives:** (may be used to satisfy writing requirement)

—8  
Total 128

*\*Approved mathematics and science electives:*

*Students who have an explicit interest in broadening their knowledge in a specific area of math or science should select an elective from the following approved course list. For more information about these selections, students are encouraged to visit with an undergraduate adviser before registering for an approved math or science elective.*

APM 255      *Introduction to Differential Equations with Matrix Algebra*

APM 332      *Applied Matrix Theory*

APM 433      *Numerical Methods*

APM 434      *Applied Numerical Methods: Matrix Methods*

APM 463      *Graph Theory and Combinatorial Mathematics*

APM 477      *Computer Algebra*

BIO 111      *Biology*

CHM 143      *Chemical Principles*

MOR 242      *Elementary Models in Operations Research*

PHY 325      *Biological Physics*

PHY 326      *Medical Physics*

PHY 331      *Optics*

PHY 366      *Vibrations and Waves*

PHY 371      *Foundations of Modern Physics*

MTH 352      *Complex Variables*

STA 322      *Regression Analyses*

*or others by approval by petition to the SECS Committee on Academic Standing.*

### Performance requirements

In addition to previously stated requirements, satisfactory completion of the program requires an average grade of at least 2.00 within each group: namely, mathematics and science, core subjects and professional subjects. Within professional subjects, at most two grades below 2.0 are permitted, at most two different courses may be repeated and a total of three repeat attempts is permitted.

### Sample computer science schedule

Students entering the School of Engineering and Computer Science with the required background may follow a schedule such as the one indicated below. However, students will need additional time to complete the program if they do not have the required background upon entrance to the program.

**Freshman year** — fall semester: MTH 154, CSE 142, two general education, 14 credits; winter semester: MTH 155, PHY 151, CSE 230, general education, 16 credits.

**Sophomore year** — fall semester: APM 263, PHY 152, EGR 240, 200 Level Program. Elective, general education, 18 credits; winter semester: MTH 275, CSE 231, 200-level professional CSE elective, general education, CSE 280, 18 credits.

**Junior year**—fall semester: STA 226, CSE 335, 361, general education, 16 credits; winter semester: CSE 343, 364, 337, general education or free elective, 16 credits.

**Senior year** — fall semester: CSE 450, 345, professional elective, mathematics or science elective, 16 credits; winter semester: CSE 402, CSE 480, professional elective, free elective, 14 credits.

## Major in information technology

The program in information technology (IT) leading to a Bachelor of Science degree prepares students for a professional career in IT. The program provides students with sufficient technical strength and a comprehensive understanding of information technology practice in context to act as problem solvers in various settings. This is achieved by requiring every student to either do an industry internship or participate in an industry-sponsored project, or perform undergraduate research under the supervision of a faculty mentor. The program also includes a strong professional component to develop skills in technical communication, ethics and group work. Finally, every IT major has a choice of an interdisciplinary track of upper division courses (12 credit hours) in an application area of IT.

### Program Educational Objectives

The objectives of the Information Technology program are to produce graduates who:

- are able to design, implement and manage IT solutions to meet an organization's goals;
- can adapt and contribute to new technologies in support of IT infrastructure;
- are prepared to pursue successfully graduate study in IT-related disciplines;
- are proficient in written and oral communication;
- can function successfully in the automotive and other global industries;
- can serve in a variety of roles such as solving problems with technical and nontechnical elements, serving as team members, and leading others; and
- have high standards of professional and ethical responsibility.

To earn the Bachelor of Science degree with a major in information technology, students must complete a minimum of 128 credits, satisfy writing requirement (also see Undergraduate degree requirements) and meet the following requirements:

	<b>Credits</b>
<b>General education</b>	<b>24</b>
<b>Mathematics and science</b>	
MTH 154 or MTH 122    Calculus	4
STA 227                    Introduction to Statistical Methods	4
APM 163                    Mathematics for Information Technology	4
Approved science elective*	<u>4</u>
	16
<b>Information Technology core</b>	
CIT 130                    Introduction to Computer Programming	4
CIT 220                    Spreadsheet Programming and Reporting	4
CIT 230                    Object-Oriented Computing I	4
CIT 247                    Introduction to Computer Networks	4
CIT 252                    Interactive Web Systems	<u>4</u>
	20
<b>Professional subjects</b>	
<b>Required:</b>	
CIT 248                    Computer Systems	4
CIT 280                    Sophomore Project	2
CIT 337                    Software Engineering and Practice	4
CIT 345                    Database Design and Implementation	4
CIT 350                    Human Computer Interaction	4
CIT 352                    System Analysis	4
CIT 402                    Professional Practice	2
CIT 448                    Information Security Practice	4

CIT 480	Senior Capstone Project	<u>4</u>
		32
<b>Electives — 20 credits chosen from:</b>		
8 credits of courses from one of the following tracks:		8
• System administration Track (CIT 348, 349)		
• Bioinformatics Track (BIO 341, CSE 461)		
4 credits of Internship (CIT 496) or Industrial Project (CIT 497) or Undergraduate Research (CIT 498)		4
8 credits of course work in management and communications from the following:		8
• CIT Project Management (CIT 450)		
• Group Dynamics and Communication (COM 202)		
• Communication in Organizations (COM 304)		20
<b>Free electives</b> (may be used to satisfy writing requirement)		<u>16</u>
		Total 128

*\*Approved science electives for information technology majors are: biology courses numbered 111, 113 and higher except BIO 300; CHM 157 and higher, except CHM 300 and 497; physics courses numbered 151 and higher; environmental health courses ENV 308 and 373. Special topics and independent study courses require prior approval.*

### Performance requirements

In addition to previously stated requirements, satisfactory completion of the program requires an average grade of at least 2.00 within each group: namely, mathematics and science, core subjects and professional subjects. Within professional subjects, at most two grades below 2.0 are permitted, at most two different courses may be repeated and a total of three repeat attempts is permitted.

## Sample information technology schedule

Students entering the School of Engineering and Computer Science with the required background may follow a schedule such as the one indicated below. However, students will need additional time to complete the program if they do not have the required background upon entrance to the program.

**Freshman year** —fall semester: MTH 122 or 154, CIT 130, general education, 16 credits; winter semester: APM 163, CIT 220, science elective, general education, 16 credits.

**Sophomore year** —fall semester: STA 226, CIT 230, CIT 220, general education, 16 credits; winter semester: CIT 248, CIT 252, CIT 280, general education, 14 credits.

**Junior year** —fall semester: CIT 337, CIT 345, IT track elective 1, general education, 16 credits; winter semester: CIT 350, CIT 352, IT track elective 2, free elective, 16 credits.

**Senior year** —fall semester: CIT 402, IT track elective 3, COM 202/304, free elective, 18 credits; winter semester: CIT 480, CIT 450, CIT 448, free elective, 16 credits.

## Minors in computer science, computing or information technology for non-engineering majors

The School of Engineering and Computer Science offers three minors, computer science minor, computing minor, and information technology minor, to students with majors other than engineering or computer science.

The minor in computer science is suitable for students with a major in mathematics, physics, chemistry or biology, who may wish to emphasize numerical, scientific and engineering aspects of computing. Students must earn a minimum of 20 credits, including the following courses: CSE 142, EGR 240, CSE 230, any two CSE courses (8 credits minimum) numbered 200 or above.

At least 12 of these credits must be taken at Oakland University. A grade of 2.0 is required in each course for this minor.

The minors in computing and information technology are suitable for students with a major in liberal arts or business, who may wish to emphasize non-numerical and symbolic data processing aspects of computing and information technology. Students must earn a minimum of 20 credits as follows for a minor in Computing: CSE 120, CSE 130 and three courses chosen from CSE 220, CSE 247, CSE 252, and CSE 230. At least 12 of these credits must be taken at Oakland University. An average grade of at least 2.0 is required in courses counted toward this minor. For an IT minor, students must earn a minimum of 20 credits in the following courses: CIT 120, CIT 122, CIT 130, and any two courses from CIT 220, CIT 230, CIT 247, and CIT 252. At least 12 of these credits must be taken at Oakland University.

Students must obtain permission from the Department of Computer Science and Engineering in order to register for CSE courses at the 300 and 400 levels.