

Master of Science in Cyber Security

Department of Computer Science and Engineering

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Program description

The Master of Science in cyber security degree program is designed to provide a strong foundation and detailed technical knowledge in information security, computer security, network security, software security as well as an appreciation of the social, policy, ethical and legal aspects of security and privacy. A natural continuation of studies is offered for students who have received a baccalaureate in computer science, information technology, computer engineering, electrical engineering, information systems, mathematics, software engineering, or a related technical area, and are interested in furthering their knowledge in cyber security. The program offers two tracks: a research track and a professional track.

Admission terms and application deadlines

Before an applicant's file can be reviewed for full program admission, all application documents must be received in Graduate Study and Lifelong Learning by the semester deadlines listed below. Incomplete applications will not be sent to departments for admission review.

- July 15 for fall semester (Aug. 15 for fall 2016 semester)
- November 15 for winter semester
- March 15 for summer semester
- International applicants
 - May 1 for fall semester
 - September 1 for winter semester

Application requirements

To be considered for graduate admission, applicants must submit all Graduate Application Requirements and additional department requirements by the published application deadlines:

1. [Graduate Application Requirements](#)
 - [Online Application for Admission to Graduate Study](#)

- *Official transcripts providing evidence of an earned baccalaureate degree from an accredited U.S. institution, OR a degree equivalent to a four-year U.S. baccalaureate degree from a college or university of government-recognized standing.*
- *Official transcripts for all post-secondary educational institutions from which the applicant earned a degree (beginning with the first baccalaureate) and for all enrollment in graduate-level coursework beyond the bachelor's degree.*
As part of the admission requirements, graduate programs may require official transcripts from post-secondary educational institutions from which the applicant earned an associate's degree and all enrollment in coursework both pre- and post-bachelor's degree.
- *International university transcripts must be evaluated by a professional credential evaluation service. Oakland University will only accept transcript evaluations completed by a NACES (National Association of Credential Evaluation service) member organization. Many applicants use World Educational Services (WES) or Educational Credential Evaluators (ECE). NACES membership can be confirmed by visiting www.naces.org/members.htm. Graduate programs requiring more detailed information may require an applicant to submit a course-by-course (or detailed) evaluation report rather than the general evaluation report. Official foreign transcripts will not be required by Oakland University since official transcripts must be submitted to and verified by the evaluation service. However, applicants must submit photocopies of their foreign transcripts with their application materials.*
- *Two official and original Recommendation for Graduate Admission forms. (Note: Some programs require more than two recommendation forms. Refer to the **program application requirements** listed below for the total number of recommendations and specific requirements for the recommendations.)*
- *Proof of English language proficiency*
- *International supplemental application and supporting documentation must be submitted before international applicants can be issued the Certification of Eligibility (I-20). This certificate is required to apply for a student visa from the U.S. embassy or consulate.*

2. **Additional department application requirements**

- **Requirements for recommendations:**
Two recommendation forms must be from faculty members of the undergraduate major department or professionals in the field who can evaluate the scholarly achievement and potential of the applicant. These recommendations form an important part of the admission credentials.
- Applicants must submit official scores from the Graduate Record Examination (GRE) if they graduated from an institution not accredited by a regional accrediting agency of the USA. The department may choose to waive the GRE requirement if at least one of the following special circumstances is met:
 - Applicant's last degree is from a U.S. institution accredited by a regional accrediting agency.
 - Applicant's overall GPA from last degree is at least 3.0 on a 4.0 scale.
 - Applicant has worked in the USA for at least two years in the engineering profession.
- Bachelor of Science in computer science, information technology, computer engineering, electrical engineering, information systems, mathematics, software engineering, or equivalent. Applicants from other disciplines would be considered after successfully completing appropriate prerequisite courses.
- Admission to master's program is selective; applicants should have an undergraduate GPA of 3.0 on a 4.0 scale or better for regular admission.
- If the applicant's undergraduate GPA is between 2.7 and 3.0 on a 4.0 scale and at least a 3.0 grade point average in technical courses related to cybersecurity, admission with limited standing may be offered.
- For applicants graduated from an institution not accredited by a regional accrediting agency of the USA, a 70% or

- better percentile score of the GRE Quantitative Reasoning section is required.
- Applicants from institutions with which Oakland University has an articulation agreement containing alternative admission criteria will be admitted according to the criteria in that agreement.

Admission review and assessment

Admission to graduate study at Oakland University is selective. In making admission recommendations to Graduate Study and Lifelong Learning, each department assesses the potential of applicants for success in the program by examining their undergraduate records, goal statement, letters of recommendation, prerequisite courses and any other admission requirements established by the academic department.

Related links

- [Readmission \(not enrolled for two years\)](#)
- [Transferring to Oakland University](#)
- [Transferring to a new program](#)

Prerequisite courses

The advanced level prerequisite courses CSE 505, 506, and 507 are fast track courses designed to prepare students who have strong academic or professional records in related fields. These courses prepare students for graduate studies within minimal time. Note that the prerequisite courses do not count towards the credits needed to obtain a graduate degree.

- CSE 505 - Object-Oriented Computing I (4 credits)
- CSE 506 - Object-Oriented Computing II (4 credits)
- CSE 507 - Design and Analysis of Algorithms (4 credits)

Degree requirements

The Master of Science in Cyber Security degree is awarded upon satisfactory completion of 32 credits in an approved program of study.

Course requirements

1. Research track (32 credits)

The research track requires 32 credits including 2 to 8 credits of thesis to graduate. The structure of credits is as follows:

a. Foundation requirement (12 credits)

Must complete **12 credits** of the following *Foundation Group* courses:

Foundation Group courses

- CSE 552 – Operating Systems (I) (4 credits)
- CSE 647 - Advanced Networking (4 credits)
- CSE 545 - Database Design and Implementation (4 credits)

b. Core requirement (4 credits)

Must complete 4 **credits** of the following *Core* course:

- CSE 681 - Information Security (**4 credits**)

c. Depth requirement

Depth Group courses

- CSE 570 - Software Security (**4 credits**)
- CSE 660 - Network Security (**4 credits**)
- MIS 641 - IS Privacy (**3 credits**)
- CIT 548 - Information Security Practice (**4 credits**)
- CSE 590 - Cyberlaw, Forensics and e-Discovery (**4 credits**)
- CSE 580 - Non Cryptographic Methods for Network Security and Privacy (**4 credits**)
- MIS 643 -Intellectual Property and the Public Domain in the Age of Remix (**3 credits**)
- MIS 680 - ST: IT Governance, Business Continuity and Risk Management (**3 credits**)
- CSE 549 - Wireless and Industrial Networks (**4 credits**)
- CSE 524 - Cloud Computing (**4 credits**)
- CSE 523 - Mobile and Smartphone Application and Development (**4 credits**)

Note: The program will require 16 semester hours of foundation and core courses and 16 semester hours of depth/elective course work for a total of 32 semester hours. Research track students are required to take Master's Thesis Research plus at least 2 depth courses.

d. Electives

Students on a research track must complete a thesis for 2 to 8 credits.

Elective Group courses

- CSE 791 - Research Initiation (**2 credits**)
- CSE 792 - Research Seminar (**2 credits**)
- CSE 691 - Master's Thesis Research (**2 to 8 credits**)
- CSE 594 - Independent Study (**2 to 4 credits**)

Note: The program will require 16 semester hours of foundation and core courses and 16 semester hours of depth/elective course work for a total of 32 semester hours. Research track students are required to take Master's Thesis Research plus at least 2 depth courses.

2. Professional track (32 credits)

The professional track requires 32 credits of graduate coursework. The structure of credits is as follows.

a. Foundation requirement (12 credits)

Must complete **12 credits** of the following *Foundation Group* courses:

Foundation Group courses

- CSE 552 – Operating Systems (I) (**4 credits**)
- CSE 647 - Advanced Networking (**4 credits**)
- CSE 545 - Database Design and Implementation (**4 credits**)

b. Core requirement (4 credits)

Must complete 4 **credits** of the following *Core* course:

- CSE 681 - Information Security (**4 credits**)

c. Depth requirement

Depth Group courses

- CSE 570 - Software Security (**4 credits**)
- CSE 660 - Network Security (**4 credits**)
- MIS 641 - IS Privacy (**3 credits**)
- CIT 548 - Information Security Practice (**4 credits**)
- CSE 590 - Cyberlaw, Forensics and e-Discovery (**4 credits**)
- CSE 580 - Non Cryptographic Methods for Network Security and Privacy (**4 credits**)
- MIS 643 -Intellectual Property and the Public Domain in the Age of Remix (**3 credits**)
- MIS 680 - ST: IT Governance, Business Continuity and Risk Management (**3 credits**)
- CSE 549 - Wireless and Industrial Networks (**4 credits**)
- CSE 524 - Cloud Computing (**4 credits**)
- CSE 523 - Mobile and Smartphone Application and Development (**4 credits**)

Note: The program will require 16 semester hours of foundation and core courses and 16 semester hours of depth/elective course work for a total of 32 semester hours. Professional track students are required to take at least 3 depth courses.

d. Electives

Elective Group courses

- CSE 791 - Research Initiation (**2 credits**)
- CSE 792 - Research Seminar (**2 credits**)
- CSE 596 - Professional Practice (**4 credits**)
- CSE 594 - Independent Study (**2 to 4 credits**)

Note: The program will require 16 semester hours of foundation and core courses and 16 semester hours of depth/elective course work for a total of 32 semester hours. Professional track students are required to take at least 3 depth courses.

Complete list of 500- to 700-level courses offered by the department

The following is the complete list of 500- to 700-level courses offered by the department. Prerequisite courses do not give any graduate credit. These are meant for students lacking sufficient background in computer science and engineering. Please consult the degree requirements to see how best to choose courses for your program of study.

Note: Courses listed under the heading *Miscellaneous* do not form a specialty group.

*These courses are cross-listed as advanced undergraduate and graduate courses. If completed as a 400-level course or equivalent as part of baccalaureate degree, the course may be used to offset graduate program requirements. However, credit will not then be awarded and must be earned by completion of an approved substitute course.

Specialty Group Courses

1. Networking and Systems Group

- CSE 549 - Wireless and Industrial Networks (4 credits)
- CSE 580 - Non Cryptographic Methods for Network Security and Privacy (4 credits)
- CSE 647 - Advanced Computer Networks (4 credits)
- CSE 652 - Operating Systems II (4 credits)
- CSE 660 - Network Security (4 credits)
- CSE 664 - Parallel Computer Architecture (4 credits)
- CSE 681 - Information Security (4 credits)

2. Embedded Systems Group

- CSE 576 - Embedded Systems Design Using FPGAs (4 credits)

3. Information Technology Group

- CSE 551 - Advanced Web Design and Application (4 credits)
- CSE 581 - Information Retrieval and Knowledge Discovery (4 credits)
- CSE 583 - E-Commerce and ERP (4 credits)
- CSE 590 - Cyberlaw, Forensics and e-Discovery (4 credits)
- CSE 591 - Bioinformatics (4 credits)
- CSE 645 - Database Systems II (4 credits)
- CSE 681 - Information Security (4 credits)

4. Software Engineering Group

- CSE 530 - Software Prototyping and Validation (4 credits)
- CSE 538 - Software Verification and Testing (4 credits)
- CSE 539 - Software Engineering (4 credits)
- CSE 541 - Software Project Planning, Management and Maintenance (4 credits)
- CSE 542 - Software Architecture and Components (4 credits)
- CSE 570 - Software Security (4 credits)

5. Intelligent Computing Group

- CSE 513 - Computational Intelligence (4 credits)
- CSE 555 - Visual Computing (4 credits)
- CSE 581 - Information Retrieval and Knowledge Discovery (4 credits)
- CSE 616 - Pattern Recognition and Machine Learning (4 credits)
- CSE 655 - Advanced Visual Computing (4 credits)

Miscellaneous

- CSE 594 - Independent Study (2 to 4 credits)
- CSE 595 - Special Topics (2 to 4 credits)
- CSE 596 - Professional Practice (2 to 4 credits)
- CSE 691 - Master's Thesis Research (2 to 8 credits)
- CSE 794 - Independent Study (2 to 4 credits)
- CSE 795 - Special Topics (2 to 4 credits)

Satisfactory academic progress

Satisfactory Academic Progress (SAP) is the term used to denote a student's successful completion of coursework toward a certificate or degree. Federal regulations require the Office of Financial Aid to monitor Satisfactory Academic Progress for all financial aid recipients each semester.

Students who fall behind in their coursework, or fail to achieve minimum standards for grade point average and completion of classes, may lose their eligibility for all types of federal, state and university aid. Contact the Office of Financial Aid for additional details.

Good academic standing

All graduate students are expected to remain in good academic standing throughout the entire course of their graduate program. To be in good academic standing, a graduate student must make satisfactory progress toward fulfilling degree requirements, including the completion of critical degree milestones as set forth by the academic program. The student must also maintain a minimum semester and overall GPA of 3.0.

Good academic standing is a requirement for:

- Holding a Graduate Assistantship
- Receiving a fellowship or scholarship
- Advancing to candidacy for a graduate degree
- Going on a leave of absence
- Obtaining a graduate certificate or degree from Oakland University.

Additionally, graduate students must meet all department academic standards which may be more stringent than the minimum set forth by the University.

Department requirements: The minimum satisfactory grade for graduate work is 3.0. Credit for completion of a course in the Master of Science program will be given for grades of 2.5 or above but not more than two grades may be in the range of 2.5 to 2.9. Graduate credit will not be awarded for grades below 2.5. To repeat a course, a student must have the permission of the graduate committee of the school.

All grades received as a graduate student are used in computing the GPA except that, if a course has been repeated, the most recent grade is used in the calculation of the GPA. A graduate student is placed on academic probation if the student's overall GPA drops below 3.0 or if the student receives more than one grade below 3.0, including the original grade(s) of any repeated

course(s). A graduate student receiving a grade less than 3.0 while on probation is subject to dismissal. A graduate student receiving more than two grades below 3.0 is subject to dismissal whether or not the student was put on probation previously.

In all programs the minimum grade point requirement is an average of at least 3.0. If a student's GPA is less than 3.0 after having attempted 16 credits, the student will be recommended for dismissal from the program.

Graduate students who are not in good academic standing for any reason are subject to probation and/or dismissal from further graduate study.

Related program information

Plan of study

All accepted applicants, in consultation with their assigned faculty program adviser, must develop a plan of study that details specific courses the students will use to satisfy their degree requirements. The plan of study must be approved by the faculty program adviser and submitted by the student to Graduate Study and Lifelong Learning.

Master's and graduate certificate students must submit a department-approved plan of study by the end of their first semester of graduate coursework. Doctoral students must submit an approved plan of study prior to completion of the first year of coursework. (See the Graduate Student Responsibility section of this catalog.)

Note: Credit granted for successful completion of a course toward an undergraduate degree program may not be repeated for a graduate degree. If a substitution is approved, the minimum number of program-approved graduate credits will be required. A Petition of Exception - OU Course Waiver/ Substitution requesting the substitution must be approved.

Course approval

Approval by the master's degree adviser and the department chair is required for independent study, engineering projects, a master's thesis or special topics courses that are used toward the degree. In addition, approval of the faculty administering the independent study, advising the thesis or project or teaching the special topics course must be obtained before registering for these credits. No more than 8 thesis or project credits may be used toward the degree requirements.

Transfer credit

Students transferring from other institutions are allowed to transfer a maximum of 9 credits of graduate coursework with the approval of the department.

Workload and scheduling

Full-time students must register for 8 to 12 credits per semester. Graduate assistants must be full-time students and commit 20 hours per week toward their research or teaching assistantship assignment. Graduate assistants normally register for only 8 credits per semester; however, a 12-credit load can be taken with the approval of the chair of their department.

For the convenience of part-time students employed in industry, most courses are arranged in late afternoon and early evening. However, these students should be aware of the very real demands of graduate studies and should keep outside work commitments and their academic load in balance.

Master's adviser

The progress of each regular student toward the Master of Science degree is directed by the student's adviser, a faculty member of the School of Engineering and Computer Science who is assigned at the time of admission. Incoming students seeking the degree

are urged to discuss their proposed concentration area with their adviser or other faculty members in that area. Students who wish to change their adviser can do so with the approval of the chair of their department.