**COMPUTER SCIENCE - M.S.**

**College of Arts and Sciences**  
Department of Computer Science  
241 Mathematics and Computer Science Building  
Kent Campus  
330-672-9980  
depsec@cs.kent.edu  
www.kent.edu/cs

**Description**

The Master of Science degree in Computer Science provides students with an educational and research environment to develop career paths through necessary training with emerging technologies. Graduates have the technical knowledge and skills necessary for success within the information and high technology industries.

The M.S. degree in Computer Science has two culminating options: thesis or non-thesis. Students planning to pursue a Ph.D. degree an/or academic research should select the thesis option. Students planning to pursue applied research and development in industry may select the non-thesis option. The thesis option requires original research and a written thesis. The non-thesis option requires a capstone project and an optional industrial internship.

The Computer Science major includes the following optional concentrations:

- The **Computational Data Science** concentration prepares students to process big data. In a spectrum of real-world applications, the collected data (from such sources as mobile devices, GPS, sensor/RFID networks, Internet, social media, etc.) is so large and complex, the traditional data processing tools cannot efficiently and effectively handle it. This concentration focuses on algorithms development, machine learning, computation techniques, network and computing infrastructure and software.

- The **Computer Engineering** concentration prepares students to meet the need of computer engineering professionals in the industry for designing and managing emerging smart devices and computer-integrated physical systems with programmable intelligence. Students learn the hardware-software co-design principles and theory, architecture of the associated software and hardware, devices and sensors communication protocols and the interfaces to effectively design, build and evolve such smart devices and computer-driven intelligent physical systems.

- The **Computer Security** concentration exposes students to a wide range of topics on the security of computer systems. Students study the vulnerabilities in software and networks and develop algorithms and software to protect data, using digital encryption coding, protected databases and protected computer networking techniques.

Students opting to not pursue a concentration will create a 12-credit hour individualized plan of study with their advisor.

**Fully Offered At:**

- Kent Campus

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**Admission Requirements**

- Bachelor's degree from an accredited college or university for unconditional admission
- Minimum 3.000 undergraduate GPA on a 4.000 point scale for unconditional admission
- Core components of an undergraduate computer science curriculum
- Official transcript(s)
- GRE scores
- Résumé
- Goal statement
- Three letters of recommendation
- English language proficiency - all international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning one of the following:
  - Minimum 525 TOEFL PBT score (paper-based version)
  - Minimum 71 TOEFL IBT score (Internet-based version)
  - Minimum 74 MELAB score
  - Minimum 6.0 IELTS score
  - Minimum 50 PTE score

For more information about graduate admissions, please visit the Graduate Studies admission website. For more information on international admission, visit the Office of Global Education's admission website.

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**Program Learning Outcomes**

Graduates of this program will be able to:

1. Demonstrate breadth-of-knowledge and understanding of essential facts, concepts, principles and theories relating to advanced topics in computer science.
2. Conduct literature searches, comprehend advanced research materials and uncover connections between related work and critical evaluation and synthesis.
3. Perform research, discovery and integration by applying advanced knowledge of computer science.

**Program Requirements**

**Major Requirements**

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<td>CS 69191</td>
<td>MASTER'S SEMINAR</td>
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</table>
**Computational Data Science Category**

See courses under Computational Data Science concentration

**Computer Engineering Category**

See courses under Computer Engineering concentration

**Computer Security Category**

See courses under Computer Security concentration

**Software and Application Category**

- CS 57201  HUMAN COMPUTER INTERACTION
- CS 63005  ADVANCED DATABASE SYSTEMS DESIGN
- CS 63100  COMPUTATIONAL HEALTH INFORMATICS
- CS 63901  SOFTWARE ENGINEERING Methodologies
- CS 63902  SOFTWARE EVOLUTION
- CS 64401  IMAGE PROCESSING
- CS 64402  MULTIMEDIA SYSTEMS AND BIOMETRICS
- CS 67101  ADVANCED COMPUTER GRAPHICS
- CS 67301  SCIENTIFIC VISUALIZATION
- CS 67302  INFORMATION VISUALIZATION

**Theory and Algorithms Category**

- CS 63301  PARALLEL AND DISTRIBUTED COMPUTING
- CS 64201  ADVANCED ARTIFICIAL INTELLIGENCE
- CS 64301  PATTERN RECOGNITION PRINCIPLES
- CS 66101  ADVANCED TOPICS IN ALGORITHMS
- CS 66105  PARALLEL AND DISTRIBUTED ALGORITHMS
- CS 66110  COMPUTATIONAL GEOMETRY

Culminating Requirement, choose from the following:

- CS 69099  CAPSTONE PROJECT (taken twice)
- CS 69099 & CS 69192  CAPSTONE PROJECT and GRADUATE INTERNSHIP
- CS 69199  THESIS

Additional Requirements or Concentrations

Choose from the following:

- Additional Requirements for Students Not Declaring a Concentration
- Computational Data Science Concentration
- Computer Engineering Concentration
- Computer Security Concentration

Minimum Total Credit Hours: 32

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### Additional Requirements for Students Not Declaring a Concentration

**Code**

**Title**

**Credit Hours**

**Major Requirements**

- Computer Science (CS) Electives

Minimum Total Credit Hours: 12

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### Computational Data Science Concentration Requirements

**Code**

**Title**

**Credit Hours**

**Concentration Requirements**

Concentration Electives, choose from the following:

- CS 54001  COMPUTER SCIENCE III - PROGRAMMING PATTERNS
- CS 54201  ARTIFICIAL INTELLIGENCE
- CS 54202  MACHINE LEARNING AND DEEP LEARNING
- CS 63005  ADVANCED DATABASE SYSTEMS DESIGN
- CS 63015  DATA MINING TECHNIQUES
- CS 63016  BIG DATA ANALYTICS
- CS 63017  BIG DATA MANAGEMENT
- CS 63018  PROBABILISTIC DATA MANAGEMENT

Minimum Total Credit Hours: 12

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### Computer Engineering Concentration Requirements

**Code**

**Title**

**Credit Hours**

**Concentration Requirements**

Concentration Electives, choose from the following:

- CS 53001  SOFTWARE DEVELOPMENT FOR ROBOTICS
- CS 53002  ALGORITHMIC ROBOTICS
- CS 53003  INTERNET OF THINGS
- CS 53005  ADVANCED DIGITAL DESIGN
- CS 53318  HUMAN-ROBOT INTERACTION
- CS 63201  ADVANCED OPERATING SYSTEMS
- CS 63304  CLUSTER COMPUTING
- CS 63305  MULTICORE COMPUTING
- CS 63306  EMBEDDED COMPUTING
- CS 65101  ADVANCED COMPUTER ARCHITECTURE
- CS 65202  ADVANCED COMMUNICATION NETWORKS
- CS 65203  WIRELESS AND MOBILE COMMUNICATION NETWORKS
- CS 65301  SYSTEM MODELING AND PERFORMANCE EVALUATION

Minimum Total Credit Hours: 12

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### Computer Security Concentration Requirements

**Code**

**Title**

**Credit Hours**

**Concentration Requirements**

Concentration Electives, choose from the following:

- CS 53202  SYSTEMS ADMINISTRATION
- CS 53203  SYSTEMS PROGRAMMING
- CS 55203  COMPUTER NETWORK SECURITY
- CS 57205  INFORMATION SECURITY
- CS 57206  DATA SECURITY AND PRIVACY
- CS 57207  DIGITAL FORENSICS
- CS 57221  INTRODUCTION TO CRYPTOLOGY

Minimum Total Credit Hours: 12

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1. Courses taken for the core cannot be counted again as an elective or concentration course. The list of courses offered each semester, including department-approved special topics, is available in the department’s graduate office.

2. Students may complete a capstone-related elective course in place of an internship with approval from the graduate coordinator.

3. Students selecting the thesis option must form a master’s thesis committee, which will include the advisor and at least two other graduate faculty members. The thesis topic and committee must be approved by the advisor and graduate coordinator. The final version of the thesis must be approved by the advisor, thesis committee and graduate coordinator.
Graduation Requirements

• Maximum 12 credit hours of 50000-level courses may be applied toward the degree.