COMPUTER SCIENCE, MS

Vision Statement
The vision of the department is to create and support dynamic research and teaching environments that promote a computationally empowered society ready to tackle complex problems in rapidly changing technological landscapes.

Program Contact Information
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ewiemers@unomaha.edu

Program Website (https://www.unomaha.edu/college-of-information-science-and-technology/academics/degrees-programs.php)

Other Program Related Information
Fast Track
The Department of Computer Science has developed a Fast Track program for highly qualified and motivated students providing the opportunity to complete a bachelor’s degree and a master’s degree in an accelerated time frame. With Fast Track, students may count up to 9 graduate credit hours towards the completion of their undergraduate program as well as the graduate degree program. Students will work with both undergraduate and graduate advisors to ensure graduate classes selected will count toward both programs, should a student wish to earn a graduate degree in a separate College of Information Science & Technology (CIST) area than their undergraduate degree.

Program Specifics:
• This program is available for undergraduate students pursuing any CIST undergraduate degree desiring to pursue an MS in either the same or a related CIST field.
• Students must have completed no less than 60 undergraduate hours.
• Students must have a minimum undergraduate GPA of 3.0.
• Students must complete the Fast Track Approval form and obtain all signatures and submit to the Office of Graduate Studies prior to first enrollment in a graduate course.
• Students will work with their undergraduate advisor to register for the graduate courses.
• A minimum cumulative GPA of 3.0 is required for graduate coursework to remain in good standing.
• Students remain undergraduates until they meet all the requirements for the undergraduate degree and are eligible for all rights and privileges granted undergraduate status including financial aid.
• Near the end of the undergraduate program, formal application to the graduate program is required. All applicants will need to meet any other admission requirements established for the MS in selected CIST program. The application fee will be waived if the applicant contacts the Office of Graduate Studies for a fee waiver code prior to submitting the MS application.
• Admission to Fast Track does NOT guarantee admission to the graduate program.
• The admit term must be after the completion term of the undergraduate degree.

Admissions
General Application Requirements and Admission Criteria (http://catalog.unomaha.edu/graduate/admission/)

Program-Specific Requirements
Application Deadlines (Spring 2025, Summer 2025, and Fall 2025)
Applicants are strongly encouraged to apply as early as possible, especially if applying for assistantships or scholarships. Some scholarships may have earlier deadlines or run out of funding.
• Fall Admission:
  • May 1 for international applicants who are required to secure a new student visa
  • July 1 for all other applicants
• Spring Admission:
  • October 1 for international applicants who are required to secure a new student visa
  • November 1 for all other applicants
• Summer Admission:
  • March 1 for international applicants who are required to secure a new student visa
  • March 15 for all other applicants

Other Requirements
• The minimum undergraduate grade point average (GPA) requirement for the MS in computer science program is 3.0 or equivalent score on a 4.0 scale. Applicants should have the equivalent of a four-year undergraduate degree.
• Entrance Exam: The Graduate Record Exam (GRE) is not required, but those who are applying for a graduate assistantship are strongly encouraged to submit their official GRE results. GRE results cannot be older than five years. Successful applicants have typically had GRE scores of 150 verbal and 160 quantitative or better.
• English Language Proficiency: Applicants are required to have a command of oral and written English. Those who do not hold a baccalaureate or other advanced degree from a predetermined country on the waiver list (https://www.unomaha.edu/office-of-graduate-studies/admissions/entrance-exams.php), must meet the minimum language proficiency score requirement in order to be considered for admission.
  • Internet-based TOEFL: 80, IELTS: 6.5, PTE: 53, Duolingo: 110
• Resume: Submit a detailed resume indicating your work experience and background.
• OPTIONAL: One letter of recommendation from a reference who can evaluate your work and/or academic achievements.
• OPTIONAL: Application for Graduate Assistant Position
  • If interested in applying for Graduate Assistant (GA) positions, please submit a letter stating your research area interests and why you feel you would make a good GA. Please note that GA positions will be considered after admission and program admission is not a guarantee of receiving a GA position.

Degree Requirements
Undergraduate Deficiencies
The curriculum for the MS in computer science requires a basic knowledge of computer fundamentals including mathematics, programming, data structures, computer architecture and operating systems. Successful completion of these courses with a “B-” or better in each course is required to become an unconditionally admitted student.
Core Courses
The five courses listed below provide an overall breadth in the areas of languages, algorithms, architecture, operating systems, and software engineering. Refer to the UNO Graduate College Quality of Work Standards for additional grade requirements.

Students selecting the thesis/project option or declaring a concentration area as part of their program are required to take three core courses; students selecting coursework option with no area of concentration must take all five core courses (note that some core courses are needed as prerequisites for certain areas of concentration).

Coursework Option
Core Courses
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSCI 8000</td>
<td>ADVANCED CONCEPTS IN PROGRAMMING LANGUAGES</td>
<td>3</td>
</tr>
<tr>
<td>CSCI/MATH 8080</td>
<td>DESIGN AND ANALYSIS OF ALGORITHMS</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 8150</td>
<td>ADVANCED COMPUTER ARCHITECTURE</td>
<td>3</td>
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<tr>
<td>CSCI 8530</td>
<td>ADVANCED OPERATING SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 8700</td>
<td>SOFTWARE SPECIFICATIONS AND DESIGN</td>
<td>3</td>
</tr>
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</table>

Electives
Select either three or five graduate-level computer science courses depending on whether a computer science area of concentration is declared.

Concentrations
All areas of concentration require four classes selected according to the requirements of each concentration. See Computer Science Concentrations.

Thesis Option
Core Courses
Select three of the following: 9

- CSCI 8000 ADVANCED CONCEPTS IN PROGRAMMING LANGUAGES
- CSCI/MATH 8080 DESIGN AND ANALYSIS OF ALGORITHMS
- CSCI 8150 ADVANCED COMPUTER ARCHITECTURE

Electives
Select any five additional graduate-level computer science courses.

Concentrations
Artificial Intelligence
The concentration in artificial intelligence provides students with an in-depth understanding of the principles and technologies used to embody machines with human-like intelligent capabilities. Students taking this concentration will have an opportunity to learn, as well as perform hands-on experiments in different areas of artificial intelligence such as software agents, multi-agent and multi-robot systems, machine vision and image processing technologies, neural network based adaptive software systems, heuristics and stochastic optimization techniques for critical decision making, machine learning and knowledge engineering techniques for embedding intelligence in computers and information systems.

Students must take any three (3) of the five (5) core courses listed under the Requirements tab (9 hours).

Total Credit Hours
Thesis Option: 30 hours
Project Option: 30 hours
Coursework Option: 33 hours
Elective Courses
Select three of the following: 9

- CSCI 8110 ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE
- CSCI 8300 IMAGE PROCESSING AND COMPUTER VISION
- CSCI 8360 MACHINE LEARNING FOR TEXT
- CSCI 8450 ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING
- CSCI 8476 PATTERN RECOGNITION
- CSCI/MATH 8480 MULTI-AGENT SYSTEMS AND GAME THEORY
- CSCI 8486 ALGORITHMS FOR ROBOTICS
- CSCI 8590 FUNDAMENTALS OF DEEP LEARNING

Total Credits 12

Database and Knowledge Engineering Concentration
The database and knowledge engineering concentration is designed to introduce students to preliminary as well as advanced concepts in data and knowledge management.

Students must take any three (3) of the five (5) core courses listed under the Requirements tab (9 hours).

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<thead>
<tr>
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<tbody>
<tr>
<td>Required Courses</td>
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<tr>
<td>CSCI 8856 DATABASE MANAGEMENT SYSTEMS</td>
<td>3</td>
<td></td>
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<tr>
<td>CSCI 8340 DATABASE MANAGEMENT SYSTEMS II</td>
<td>3</td>
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</tr>
<tr>
<td>CSCI 8360 MACHINE LEARNING FOR TEXT</td>
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</table>

Elective Courses
Select one of the following: 3

- CSCI 8040 LARGE SCALE NETWORK ANALYSIS ALGORITHMS
- CSCI 8050 ALGORITHMIC GRAPH THEORY
- CSCI 8350 DATA WAREHOUSING AND DATA MINING
- CSCI 8390 ADVANCED TOPICS IN DATA BASE MANAGEMENT
- CSCI 8876 DATABASE SEARCH AND PATTERN DISCOVERY IN BIOINFORMATICS

Total Credits 6

Dependable Computing Systems Concentration
The objective of the Dependable Computing Systems (DCS) concentration is to provide the students with a broad introduction to the design and evaluation of secure and dependable distributed computing systems. The concentration focuses on the theory, development, performance evaluation, and testing of systems to cope with the today’s complex challenges such as failures, malicious adversaries, integrity, safety, and availability. The general domains include network security, software assurance, and fault tolerance. Students will be exposed to both software and hardware aspects for building such systems.

Students must take any three (3) of the five (5) core courses listed under the Requirements tab (9 hours).

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<tr>
<td>CSCI 8410 DISTRIBUTED SYSTEMS AND NETWORK SECURITY</td>
<td>3</td>
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Total Credits 12

Network Technologies Concentration
The concentration in network technologies will equip students to design, build, manage and leverage today’s complex communication networks. This program covers not only a blend of theoretical topics and practical examples, but also state of the art network technologies such as mobile computing, distributed systems, wireless technologies, and network security.

Students must take any three (3) of the five (5) core courses listed under the Requirements tab (9 hours).

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<tr>
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<tr>
<td>CSCI 8040 LARGE SCALE NETWORK ANALYSIS ALGORITHMS</td>
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<tr>
<td>CSCI 8050 ALGORITHMIC GRAPH THEORY</td>
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<tr>
<td>CSCI/MATH 8156 GRAPH THEORY &amp; APPLICATIONS</td>
<td>3</td>
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<tr>
<td>CSCI 8610 FAULT TOLERANT DISTRIBUTED SYSTEMS</td>
<td>3</td>
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<tr>
<td>CSCI 8620 MOBILE COMPUTING AND WIRELESS NETWORKS</td>
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Total Credits 12

Software Engineering Concentration
The concentration in software engineering is designed to address the growing market demand for software engineers. The concentration covers fundamental and advanced principles in all aspects of software development, equipping students with the necessary technical background to quickly adapt to rapidly changing software engineering practices and technologies.

Students must take CSCI 8700 as one of the three (3) core courses chosen from the Requirements tab (9 hours).

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<tr>
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<tr>
<td>Elective Courses</td>
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<tr>
<td>Select 4 of the following:</td>
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<tr>
<td>CSCI 8256 HUMAN COMPUTER INTERACTION</td>
<td>3</td>
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<tr>
<td>CSCI 8266 USER EXPERIENCE DESIGN</td>
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<tr>
<td>CSCI/CYBR 8420 SOFTWARE ASSURANCE</td>
<td>3</td>
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<tr>
<td>CSCI 8430 TRUSTED SYSTEM DESIGN, ANALYSIS AND DEVELOPMENT</td>
<td>3</td>
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</tr>
<tr>
<td>CSCI 8710 MODERN SOFTWARE DEVELOPMENT METHODOLOGIES</td>
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Total Credits 12
Systems Concentration
The systems concentration pertains to the advances in ubiquitous and emerging technologies that span over the complex cores of computing systems such as network communication, distributed computing, operating systems, and computer architecture. Recent advances in computing systems include cloud computing, social computing, Internet of Things, and cyber-physical-systems. The concentration provides the students with the fundamentals of computing systems that can be pursued in hardware, software or a combination of both.

Students must take CSCI 8150 and CSCI 8530 as two of the three (3) core courses chosen from the Requirements tab (9 hours).

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<tbody>
<tr>
<td>CSCI 8160</td>
<td>INTRODUCTION TO VLSI DESIGN</td>
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<tr>
<td>CSCI 8446</td>
<td>INTRODUCTION TO PARALLEL COMPUTING</td>
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<tr>
<td>CSCI 8610</td>
<td>FAULT TOLERANT DISTRIBUTED SYSTEMS</td>
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<tr>
<td>CSCI 8760</td>
<td>COMPILER CONSTRUCTION</td>
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<td>CSCI 8156</td>
<td>GRAPH THEORY &amp; APPLICATIONS</td>
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<tr>
<td>CSCI 8430</td>
<td>TRUSTED SYSTEM DESIGN, ANALYSIS AND DEVELOPMENT</td>
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<tr>
<td>CSCI 8450</td>
<td>ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING</td>
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<td>CSCI 8620</td>
<td>MOBILE COMPUTING AND WIRELESS NETWORKS</td>
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<tr>
<td>CSCI 8626</td>
<td>COMPUTER GRAPHICS</td>
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Any course not taken listed under required courses
Depending on student's interest, a graduate course approved by GPC

Total Credits 12

Quality of Work Standards
The Graduate College Quality of Work Standards shall be applied to foundation courses (deficiency courses) as well as courses taken as part of the degree program. In particular, the GPC will recommend to the Graduate College that any

1. Student receiving a grade of "C-" or below in any graduate course or undergraduate foundation course will be dismissed from the program or, in the case of unclassified or non-degree students, be automatically denied admission.

2. Student receiving a grade of "C+" or "C" in any undergraduate foundation course or graduate course will be placed on probation or dismissed from the program. Graduate courses may be repeated once with GPC approval. Undergraduate foundation courses will follow the repeat policy for IS&T undergraduate courses.

3. At most three graduate courses ending in 6 (8xx6) will be counted toward the degree requirements. Graduate courses with an undergraduate component (listed under Undergraduate Deficiencies) are not eligible as elective courses.

4. Student must have a minimum grade point average (GPA) of 3.0 ("B"), with no grades lower than a "B-".