ARTIFICIAL INTELLIGENCE

The MS in Artificial Intelligence program consists of 30 graduate-level semester credit hours, of which 12 are foundation, 9 are concentration, and 9 are elective (including the three options of coursework or project or thesis). A concentration must be declared by admitted students.

The program includes 4 concentrations, in (1) Computer Vision, (2) Machine Learning, (3) Knowledge Management and Reasoning, and (4) Intelligent Interaction. Students must choose one of three options: coursework, MS project, or MS thesis.

The program may be completed entirely on campus, entirely online, or through a combination of on-campus and online courses.

Requirements

To satisfy the requirements for the MS degree in Artificial Intelligence, all students admitted to the program are expected to complete a minimum of thirty semester hours of graduate coursework, with a cumulative grade point average of B or better. The program of study consists of core courses, concentration courses, and electives with coursework/project/ thesis options.

Minimum Grade Requirement in addition to maintaining a minimum cumulative GPA of 3.0 or higher every semester:

- Courses in which grades of C- or below are earned cannot be used to fulfill degree requirements.
- A minimum of a 3.0 cumulative GPA or higher is required at the time of graduation.

Code	Title	Credit Hours
Required Core (12 credits):		**12**
CIS 579	Artificial Intelligence	
CIS 581	Computational Learning	
or ECE 579	Intelligent Systems	
CIS 505	Algorithm Analysis and Design	
CIS 553	Software Engineering	

Concentrations

 Students must choose one concentration (Computer Vision, Intelligent Interaction, Knowledge Management and Reasoning, Machine Learning) and complete 3 courses (9 credits) from the selected concentration.

Electives and Options

(9 credits): Any course(s) from an MS in AI concentration area(s) outside the student's selected concentration can be an elective course(s). Additionally, the elective course(s) can be drawn from other CECS and partner college courses by faculty advisor or program director approval (excluding ENGR 500 and ENGR 501). The total number of elective courses should be three, including one of three options: (i) Coursework: taking three elective courses; (ii) Project: taking an MS Project by completing a 1-semester project (through the MS Project course in lieu of an elective) and two additional elective courses, or (iii) Thesis: taking an MS Thesis by completing a 2-semester thesis project (through the MS Thesis course in lieu of two electives) and one additional elective course. It is mandatory that the student select one of these three options.

Option 1: Coursework. This option requires three elective courses from an MS in AI concentration area(s) outside the student's selected concentration. The minimum requirements for this option are as follows:

- Foundation courses – 12 credit hours
- Concentration courses – 9 credit hours
- Elective courses — 9 credit hours

Option 2: MS Project. This option requires a project report describing the results of an independent study project under the supervision of the advisor. The scope of the research topic for the project should be defined in such a way that a full-time student could complete the requirements for a master's degree in 24 months or 6 semesters following the completion of course work by regularly scheduling graduate research credits. The minimum requirements for this option are as follows:

- Foundation courses – 12 credit hours
- Concentration courses – 9 credit hours
- Elective courses – 6 credit hours
- Master's project – 3 credit hours

Option 3: MS Thesis. This option requires a research thesis prepared under the supervision of the advisor. The thesis describes a research investigation and its results. The scope of the research topic for the thesis should be defined in such a way that a full-time student could complete the requirements for a master's degree in 24 months or 6 semesters following the completion of course work by regularly scheduling graduate research credits. The minimum requirements for this option are as follows:

- Foundation courses – 12 credit hours
- Concentration courses – 9 credit hours
- Elective courses – 3 credit hours
- Master's Thesis — 6 credit hours

Concentrations

Select one of the following concentrations and complete 3 courses (9 credits) from the selected concentration:

Code	Title	Credit Hours
Computer Vision Concentration		
Select 3 courses (9 credits) from the following:		9
CIS 515	Computer Graphics	
CIS 551	Advanced Computer Graphics	
CIS 552	Information Visualization and Virtualization	
CIS 652	Advanced Information Visualization and Virtualization	
ECE 577	Engineering in Virtual World	
ECE 585	Pattern Recognition	
ECE 586	Digital Image Processing	
ECE 587	Sel Top:Image Proc/Mach Vision	
ECE 588	Robot Vision	
ECE 5831	Pat Rec & Neural Netwks	
HCDE 530	Information Visualization	

Code	Title	Credit Hours
Intelligent Interaction Concentration		
Select 3 courses (9 credits) from the following:		9
CIS 569	Wireless Sensor Networks and IoT	
CIS 582	Trustworthy Artificial Intelligence	
CIS 585	Advanced Artificial Intelligence	
CIS 587	Computer Game Design and Implementation	
CIS 588	Computer Game Design II	
CIS 589	Edge Computing	
CIS 679	Research Advances in Computational Game Theory and Economics	
ECE 531	Intelligent Vehicle Systems	
ECE 545	Intro Robot Syst	
ECE 544	Mobile Robots	
IMSE 548	Res.Meth.Human Fctrs/Ergonomic	
IMSE 577	Human-Computer Interaction	

Code	Title	Credit Hours
Knowledge Management and Reasoning Concentration		
Select 3 courses (9 credits) from the following:		9
CIS 511	Introduction to Natural Language Processing	
CIS 536	Text Mining and Information Retrieval	
CIS 540	Foundation of Information Security	
CIS 552	Information Visualization with Parallel Computing	
CIS 568	Data Mining	
or ECE 537	Data Mining	
CIS 581	Computational Learning	
CIS 582	Trustworthy Artificial Intelligence	
CIS 583	Deep Learning	
CIS 585	Advanced Artificial Intelligence	
CIS 586	Advanced Data Management	
CIS 685	Research Advances in Artificial Intelligence	
CIS 5700	Advanced Data Mining	
ECE 5001	Analytic and Comp Math	
IMSE 510	Probability & Statistical Mod	
IMSE 514	Multivariate Statistics	

Code	Title	Credit Hours
Machine Learning Concentration		
Select 3 courses (9 credits) from the following:		9
CIS 511	Introduction to Natural Language Processing	
CIS 512	Introduction to Quantum Computing	
CIS 536	Text Mining and Information Retrieval	
CIS 581	Computational Learning	
CIS 583	Deep Learning	
CIS 585	Advanced Artificial Intelligence	
ECE 552	Fuzzy Systems	
ECE 555	Stochastic Processes	
ECE 579	Intelligent Systems	
ECE 583	Artificial Neural Networks	
ECE 679	Adv Intelligent Sys	

IMSE 505	Optimization	
IMSE 606	Advanced Stochastic Processes	

Leaning Goals

1. Understand representations, algorithms and techniques used across works in artificial intelligence and be able to apply and evaluate them in applications as well as develop their own.
2. Understand and apply machine-learning techniques, in particular to draw inferences from data and help automate the development of AI systems and components.
3. Understand the various ways and reasons humans are integrated into mixed human-AI environments, whether it is to improve overall integrated system performance, improve AI performance or influence human performance and learning.
4. Understand the ethical concerns in developing responsible AI technologies.
5. Implement AI systems, model human behavior, and evaluate their performance.