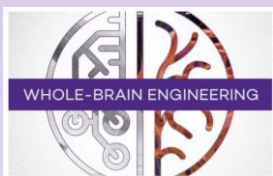Northwestern | ENGINEERING
## MS in Artificial Intelligence

## About

Drawing on Northwestern Engineering's whole-brain philosophy and leadership in cognitive science, the Master of Science in Artificial Intelligence program aims to serve this demand by producing students who have exceptional technical skills and also understand the nature of the human environments in which the systems they build will be deployed. Our goal is to educate and train students in all aspects of how the emerging technologies of machine intelligence can be designed and deployed to interact and integrate with human partners.

WHOLE-BRAIN ENGINEERING

We augment the analytical core of engineering with design, entrepreneurship, leadership, personal development, and unusual collaborations to imagine what's next and take the world in a whole new direction.

# Partner-Sponsored Capstone Projects in Artificial Intelligence

# The Capstone in Intelligent Systems

In their final quarter, our MSAI students work on Capstone projects based on problems provided by our Industrial Partners. As part of these projects, students exercise their skills in design and execution aimed directly at problems coming from the real world. The goal of Capstone projects is the design and development of a solution that is integrated into larger platforms and workflow and makes use of the tools and techniques that best fit the Partner's environment. For Capstone work, students will work closely with our industrial partners to define the problem, the data to be used and the metrics for success. The Capstone quarter is almost entirely dedicated to this project work.

## Project Objectives

As with the Practicum projects, Capstones are aimed at exposing students to real-world problems, constraints, and data. In executing the project, students are expected to:

- Work with our client Partners to gain an understanding of problem scope, resource availability, and data and platform requirements

- Develop the best viable approach based on client needs and requirements
- Follow best practices in project management: establish realistic deliverables and milestones, plan, track, and report
- Exercise and enhance their skills as members of teams
- Deliver a solution that fits the Partner's needs and expectations

## Project Scope

The Capstone is run in the Fall quarter. Each term is run for ten weeks and most projects are designed around deliverables at the end of the quarter. Some projects may scope across multiple quarters if necessary. Projects and their initial scope are determined during the quarter prior to the running of the class.

Projects will begin with a kick off meeting at the beginning of the quarter to establish the problem scope and definition. Along with the framing of the problem, this kickoff is when we expect our client Partners to map out the dynamics of the work including scope, meeting times, and communication plans.

**Duration**
- 15 months (5-quarters), full-time, on-campus

**Start Date**
- September

**Course Structure**
- Four quarters of coursework (with industry interaction) and summer internship program

**Class Size**
- First year of program: 20 students; subsequent years: 45-60 student cohort

**Features**
- Coursework in core AI as well as in HCI and human cognition
- Focus on impact and integration that reach beyond the theory
- Independent study project with faculty mentors
- 3-month external internship or work in Northwestern AI lab
- Capstone project working with industry partners

**Location**
- Evanston campus

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## Program Highlights

- Understanding of depth and breadth of artificial intelligence technologies, including machine learning, natural-language understanding, and automated decision-making

- Exploration of the psychology and design implications of human interactions with intelligent systems

- Understanding of the ways that business needs and workflow affect how intelligent systems are deployed

- A customized curriculum that combines computer science, business, psychology, and design coursework

## Project Dynamics

For Capstone projects, students may work alone or in small teams of two to three. The problems used to drive this work are scoped by a ten week development period. The problems are provided by our client Partners which include companies, not-for-profit organizations and other academic units within Northwestern. The work takes place under the supervision of an Artificial Intelligence faculty adviser, with ongoing feedback and review from the project sponsor.

Some teams may include advance undergraduate developers working under the direction of our MSAI students as well as students from the Kellogg MBA program to work with the teams as product managers.

## Project Focus

As one would expect, the projects are focused on

Applications of one or more Artificial Intelligence technologies. Examples of projects may include:

- *Development of a Machine Learning approach to predict equipment failure*
- *Design and development of a task directed conversational interface*
- *Development of a classifier to identify money laundering activity*
- *Development of system for sentiment analysis for marketing*
- *Use of data describing sales, product and company descriptions to qualify customers*
- *Construction of a recommendation model based on social media behavior*

In general, the nature of the problem is determined by the interests and needs of our client Partners.

## Partner Responsibilities

While the goals for the students are focused on learning, we want to provide our Partners with genuine value and solutions to the problems that they are providing. To support this work we are asking for a high level of engagement from our Partners. This engagement is focused on three primary areas: problem description, data availability, direction and guidance.

- Description of the problem and what would constitute a solution
- Access to the data associated with the work that needs to be done
- Development of a collaborative definition of project milestones and work plan
- Participation in ongoing reviews and final evaluation of the work

## Plan for the Future

It is clear that artificial intelligence is entering the enterprise. To succeed, businesses must be prepared with designers and developers who both understand the technologies of today and how to integrate them into the products of tomorrow. With the right skills and vision, the power of machine intelligence can provide organizations with the ability to compete and excel.

Going beyond the technologies to their use and impact, the Master of Science in Artificial Intelligence program of the Computer Science Division at Northwestern University trains students in how to harness intelligent systems to create products that support, enhance, and amplify human abilities. With a focus on the use of these new technologies in solving real-world problems, our students have a view of innovation driven by business needs.

With our graduates, businesses have an opportunity to integrate AI into a larger strategy of transformation driven by machine intelligence crafted by the next wave of leaders in the field.

## Project Deliverables

The general policy for Capstone projects is that client Partners will be given access to the final reports, presentations and code developed by students in the class. Any Intellectual Property developed will remain with the students and Northwestern but will be available for use with no restrictions. We understand that some Partners may want exclusive ownership of the work and the MSAI program is open to discussion of how that can be accommodated.

## Capstone Fees

The assumption with Capstone projects is that students will be working on projects that have genuine business value to our Partners. The work will tend to include some use of Partner data and integration with Partner infrastructure. Given this and issues of IP rights, student focus, and faculty participation, Capstone projects will have some fees associated with them.

# For further information, contact us:

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