Master of Science in Artificial Intelligence at the Naval Postgraduate School: AI for the Warfighter

Computer Science Department, Curriculum 388

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The Master of Science in Artificial Intelligence (MSAI) degree program confers advanced knowledge, skills, and practice necessary to develop, assess, and deploy AI for the military and national security. Graduates will lead AI integration within the Department of War.

The MSAI program looks deeply into core AI technologies. It emphasizes practical application through projects with realistic military scenarios. It goes into responsible AI principles and project management of AI systems. It adapts rapidly to the evolving AI landscape.

The program is designed for active-duty military officers and qualified DoD civilian employees who understand computer science principles and seek to master artificial intelligence. Candidates should demonstrate strong analytical and problem-solving skills.

The program requires residence at NPS, and is four quarters long with 21 courses total. It contrasts with the eight-quarter 36-course Computer Science degree (see curriculum 368 at https://nps.edu/web/cs/cs_curriculum) option with an artificial-intelligence specialization (which accepts a broad range of applicants), the four-quarter four-course "AI for Military Use" certificate curricula 128 and 129 (https://online.nps.edu/w/128-artificial-intelligence-for-military-use-certificate) providing a broad and mostly nontechnical overview of AI, and the other specialized certificate programs in AI offered by the Computer Science Department.

1. **Program outcomes**

- Equip students with advanced AI techniques and skills tailored to address complex military challenges.

- Through a combination of challenging coursework, hands-on projects, and expert mentorship, students will gain a deep understanding of AI.

- Apply AI in application areas such as defense systems, cybersecurity, surveillance, operations planning, and strategic decision-making.

- Demonstrate proficiency to develop innovative solutions to enhance national security and defense capabilities.

2.   Learning objectives

- Communicate complex data- and AI-related concepts in a well-organized way through verbal, written, and/or visual means.

- Develop and recommend AI analytic approaches or solutions to problems and situations.

- Engage in hands-on end-to-end team implementation projects with participation of subject-matter experts from the application domain.

- Use data preprocessing and programming skills to put raw data into useful forms for AI.

- Conduct hypothesis testing using statistical processes, and develop strategic insights from large data sets.

- Compare and contrast the main types of AI models and how they work.

- Design, train, evaluate, and optimize machine-learning models.

- Evaluate AI models with standard metrics.

- Discuss and apply modern concepts of software engineering for AI.

- Recognize and articulate ways of thwarting threats from adversarial AI.

- Use AI to add lethality and deterrence to military applications such as targeting, signal processing, intelligence gathering, battle management, wargaming, cyberspace operations, predictive maintenance, logistics, and automated help desks.

- Describe issues involving responsible AI including privacy, ethics, and social implications.

3.   Admission to the program

Apply through the NPS Admissions Office, admissions@nps.edu.

Admission is based on the previous academic record.

- An undergraduate degree in Computer Science or related field, with above average grades in mathematics, and at least one course in artificial intelligence, is sufficient for admission. New graduates of the US Naval Academy should qualify.

- Applicants with a technical undergraduate degree other than computer science that possess documented academic or practical experience in computer programming, discrete math, linear algebra, probability and statistics, computer operating systems and architectures, databases, and networking/distributed systems will also be considered, but may be required to take an additional refresher quarter by the Admissions Committee.

4. **Course matrix for the M.S. in Artificial Intelligence**
   Given on the following page. Some or all of the courses shown in quarter 0 or the "refresher" quarter may be required for the student by the Admissions Committee.

   The matrix has three slots that can be used for an M.S. thesis: a "restricted elective" slot in the third quarter, a "restricted elective" slot in the fourth quarter, and the "project or thesis" slot in the fourth quarter. A thesis is appropriate when the student wants to develop a particular application of AI.

   Alternatively, the student can take two courses as "restricted electives" and complete a one-quarter "Capstone Project" related to those two courses. The two electives must be approved by the Curriculum's Academic Associate. The two courses selected must be related to one another and the capstone project, and not significantly overlap existing courses in the Curriculum. A capstone project is appropriate when a student wants to explore a broad subarea or application area of AI.

   In 2026, we are starting the program early in the Summer quarter with "Quarter 1" as indicated in the matrix; there will be no refresher courses for this cohort. 2027 and subsequent years will have a refresher quarter in Summer quarter and "Quarter 1" in the subsequent Fall quarter.

Course matrix for the M.S. in Artificial Intelligence, Naval Postgraduate School

Refresher for students lacking background in AI	CS3310 (4-1), Artificial Intelligence	CS3315 (3-1), Introduction to Machine Learning and Big Data	CS4000 (0-2), Harnessing AI (on video)	MA3333 (3-2) Math for AI (under development)	
Quarter 1, Fall	CS4326 (4-1) AI on the Edge	CS4313 (3-2), Advanced Robotic Systems	CS4340 (4-0), Trustworthy and Responsible AI	CS4531 (3-2), Data Operations and DevSecOps	CS4904 (0-1), Current Research in AI (on video)
Quarter 2, Winter	CS4321 (3-2), Deep Learning	CS4333 (4-0) Current Directions in AI	CS4325 (4-1), Ontology and Theorem Proving for Trusted Systems	CS4327 (2-3), Naval AI Hackathon	
Quarter 3, Spring	CS4323 (3-2), Bayesian Methods for Neural Networks	CS4317 (3-2), Language Systems	CS4330 (3-2), Computer Vision	Restricted Elective or CS0810, Thesis (0-8)	
Quarter 4, Summer	CS4324 (4-1), Adversarial and Secure Machine Learning	MV4025 (3-2), Cognitive and Behavioral Models for Simulations	Restricted Elective or CS0810, Thesis (0-8)	CS0809 (0-8), Capstone Project in Computing, or CS0810, Thesis	