ARTIFICIAL INTELLIGENCE EDUCATION

AT THE NAVAL POSTGRADUATE SCHOOL

NPS
PRAESTANTIA PER SCIENTIAM
1909

WHERE SCIENCE MEETS THE ART OF WARFARE

MISSION

Provide defense-focused graduate education, including classified studies and interdisciplinary research, to advance the operational effectiveness, technological leadership and warfighting advantage of the Naval service.

NAVAL POSTGRADUATE SCHOOL AI-RELATED EDUCATION

Current as of 29 Mar 25

Overview

This list includes certificates and courses that are explicitly and primarily about Artificial Intelligence/Machine Learning (AI/ML). However, many other courses across various departments at NPS integrate AI tools, techniques, or concepts into their curriculum. These may include modules or segments covering AI/ML applications, case studies, or practical exercises relevant to their broader educational objectives.

AI-related research at NPS, to include faculty reimbursable research and student theses/capstone projects, is provided in a separate document.

1. PhD Programs

While NPS doesn't have a formal AI PhD program, many recent PhD dissertations have been AI-related.

2. Master's Programs

NPS does not currently have an AI specialization track in the Computer Science Master's Degree program. However, the CS Department has developed a Master of Artificial Intelligence that resembles a Master of Engineering (MEng) degree. This 1-year program is exclusively for highly-qualified candidates. It is practical, highly applied, and focused on solving real-world problems. As a professional degree, it emphasizes developing robust AI systems, applying machine learning techniques, and integrating AI technologies for defense-related applications. Initiation of this program will be based on Service demand (10 student cohort).

3. Certificate Programs

Computer Science (CS)

- Artificial Intelligence for Military Use Certificate (Curriculum 128 - DL)

Operations Research (OR)

- Data Science Certificate (Curriculum 268) (Joint with Computer Science)

- Operational Data Science and Statistical Machine Learning Certificate (Curriculum 269)

4. Individual Courses

Computer Science (CS)

- CS3301: Introduction to Artificial Intelligence (Survey of topics and methods of artificial intelligence with a focus on search methods. Methods include heuristicbased search and reinforcement learning.)

- CS3310: Artificial Intelligence (Rule-based systems, heuristic search, semantic networks, problem-solving algorithms, military applications.)

- CS3315: Introduction to Machine Learning and Big Data (Decision trees, neural networks, Bayesian models, data preprocessing, military data analysis.)

- CS3331: Basics of Applied Artificial Intelligence (Knowledge representation, probabilistic reasoning, heuristic search, decision-making algorithms.)

- CS3332: Applied Machine Learning (Machine-learning techniques for military applications.)

- CS4000: Harnessing Artificial Intelligence (Introduction to AI concepts and systems for non-CS majors, covering fundamental methods, ethical considerations, and practical applications.)

- CS4313: Advanced Robotic Systems (AI for motion planning, state estimation, SLAM, task decomposition, and decision-making frameworks applied to complex robotic systems.)

- CS4323: Bayesian Methods for Neural Networks (Focuses on Bayesian techniques applied to neural networks, including uncertainty quantification, model robustness, and interpretability for AI/ML systems.)

- CS4330: Introduction to Computer Vision (Image processing, pattern recognition, classification, learning, military intelligence.)

- CS4333: Current Directions in Artificial Intelligence (Big-data management, neural networks, adversarial ML, ethics.)

- CS4324: Adversarial and Secure Machine Learning (Study of attacking and defending ML systems.)

- CS4340: Trustworthy and Responsible Artificial Intelligence (Ethical AI, humanmachine teaming, complex socio-technical systems.)

- CS4921: Ontology and Theorem Proving for Trusted Systems (Formal knowledge representation with theorem provers.)

- CS492x: Naval AI Hackathon (Practical, hands-on AI hackathon where students collaborate to solve defense-related AI challenges, applying techniques in machine learning, neural networks, computer vision, natural language processing, and decision-making systems.)

- CDAO's Leading Data- and AI-Enabled Organizations: (An executive education program designed to provide senior leaders with foundational knowledge of AI and data science. It focuses on leveraging AI for decision-making, enhancing operational efficiency, and addressing ethical and strategic implications.)

Operations Research (OR)

- OA3802: Computational Methods for Data Analytics (Building, training, deploying AI models.)

- OA4106: Advanced Data Analysis (Foundational AI/ML theory.)

- OA4118: Statistical and Machine Learning (Deep learning and advanced AI techniques.)

- OA4820: Case Studies in Applied Defense Analytics (Applying AI/ML to DoD projects.)

- OA4910: Large Language Models for Defense Applications (Foundational theory, practical LLM applications.)

Mechanical and Aerospace Engineering (MAE)

- ME4800: Machine Learning for Autonomous Operations (Decision-making, perception, control systems, robotics.)

- AE4831: Spacecraft Systems II (Machine learning applied in spacecraft design/control.)

- AE4881: Aerospace Trajectory Planning and Guidance (AI/ML for path planning frameworks.)

Electrical and Computer Engineering (ECE)

- EC3460: Introduction to Machine Learning for Signal Analytics (Covers supervised and unsupervised learning tools applied to defense-related topics such as target identification, speech/speaker recognition, image classification, and power load forecasting.)

Applied Mathematics (MA)

- MA3046: Matrix Analysis (Linear algebra solvers for deep learning frameworks).

- MA3232: Numerical Analysis (Gradient descent methods for AI model training.)

- MA4261: Distributed Scientific Computing (Algorithms, libraries on multi-GPU systems.)

- MA4311: Calculus of Variations (Mathematical principles for training deep neural networks.)

- MA4404: Structure and Analysis of Complex Networks (AI for network science.)

Space Systems Academic Group (SSAG)

- SS1100: Introduction to Programming for Space Applications (Introduction to AI/ML fundamentals.)

- SS3001: Military Applications of National Space Systems (AI/ML for decisionmaking, target recognition)

- SS3051: Military Applications of DoD and Commercial Space Systems (AI integration for decision-making.)

National Security Affairs (NSA)

- NS4259: Science and Technology in Geostrategic Competition (AI implications for geostrategic competition.)

- NS4710: Eur-Asia in the Global Economic Order (AI implications for defense, economics.)

Department of Defense Management (DDM)

- MN4128: Topics in Manpower Policy Evaluation (AI/ML for data visualization and automated code writing.)

- MN4110: Multivariate Manpower Data Analysis (AI/ML model estimation.)

(continued)

Center for Executive Education (CEE)

- Navy Senior Leader Seminar "Emerging Technology Trends" (AI is covered as a topic to military and civilian leaders.)

- Emerging Technology for the Warfighter Course (Introduces senior leaders to emerging technologies, including AI and machine learning, with discussions on their implications for defense strategy and operations.)

AI ARTIFICIAL INTELLIGENCE

VISION

The Naval Postgraduate School will become the nation's

leading institution for defense higher education and

applied research, delivering transformative solutions and

innovative leaders for decisive U.S. seapower and national

defense.

Pictured: Naval Postgraduate School campus in Monterey, California.

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