AI Strategies and Roadmap: Systems Engineering Approach to AI Development and Deployment

Jan 29-Feb 2, 2024 | Live Virtual | professional.mit.edu/aisr | Lead Instructor: David Martinez

MONDAY, Jan 29

	TOPIC	DESCRIPTION	HIGHLIGHTS
8:45–10:10 am	**D. Martinez - Introduction and Lecture 1:** Course introduction, AI background, and functional building blocks overview	Course kicks-off. Course commences with introduction to AI system architecture	AI building blocks
10:10–10:20 am	**Break**		
10:20–11:30 am	**D. Martinez - Lecture 2:** AI strategic vision and project roadmap	Formulate a strategic development plan that serves as the guiding blueprint for AI designers, developers, testers, and users/customers	Understand AI strategic development model (AISDM) used in course project
11:30 am–12:15 pm	**D. Martinez - Fireside Chat: Voice of AI practitioner**	Invited AI leader speaks on challenges and opportunities in the development and deployment of AI system capabilities	Q&A discussion with AI Practitioner
12:15–1:15 pm	**Lunch Break**		
1:15–2:25 pm	**D. Martinez - Lecture 3:** Data conditioning	First stage of the AI pipeline required to transform data into information; classes of data covered are structured and unstructured data	Learn different types of databases and data conditioning approaches
2:25–2:35 pm	**Break**		
2:35–3:50 pm	**D. Martinez - Team Proposals:** Formulate two project proposals per team	Teams discuss and select two proposals as candidates for their project (1 hr 15 min)	Teams pick two projects where AI is the technology enabler
3:50–5:00 pm	**Team Presentations:** Present to faculty and course peers	Each team has 8 minutes to present two AI team project proposals	Faculty will select one of two proposals prior to Day 2
5:00 pm	**Adjourn**	Opportunity to network	

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TUESDAY, Jan 30

	TOPIC	DESCRIPTION	HIGHLIGHTS
8:30–8:45 am	**D. Martinez - Welcome to Day 2:** Day 2 agenda plus feedback on selected team projects	Day 2: What to expect and faculty announces AI team project selection	Discussion on team project guidelines and format
8:45–10:00 am	**D. Martinez - Lecture 4:** Machine learning	Application of machine learning (ML); ML algorithms transform information into knowledge	Foundational concepts in the design of ML models
10:00–10:10 am	Break		
10:10–11:30 am	**D. Martinez – Performance Metrics and Multi-Layer Perceptron Model Demonstration** Performance evaluation techniques and Jupyter notebook	Review of techniques for assessing machine learning algorithm performance and Design an MLP model to classify MNIST fashion data	Provide critical understanding of techniques to perform ML model evaluations and design
11:30 am–12:00 pm	**D. Martinez – Short Primer on Large Language Models** Basis of generative AI	Fundamentals behind large language models and examples	High level understanding of transformer architecture
12:00–1:00 pm	Lunch Break		
1:00–2:10 pm	**D. Martinez - Lecture 5:** Modern computing as enabling technology	Understand what makes GPUs and TPUs well-matched to executing machine learning algorithms	Computational engines enabling AI breakthroughs
2:10–2:20 pm	Break		
2:20–5:00 pm	**Team Project:** Develop first draft of project strategic roadmap	Teams begin working on their respective AI projects	Complete mission, vision, and envisioned future

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WEDNESDAY, Jan 31

	TOPIC	DESCRIPTION	HIGHLIGHTS
8:30–9:45 am	**D. Martinez - Welcome to Day 3:** Day 3 agenda and faculty Q&A	Day 3: What to expect	Address any clarification on prior lectures or course project
8:45–9:55 am	**D. Martinez - Lecture 6:** Human-machine teaming	This building block of the system architecture transforms the output of the machine learning algorithms from knowledge into insight	Learn about trade-offs between roles best suited to a human vs. machines
9:55–10:05 am	Break		
10:05–11:15 am	**D. Martinez and K. Middleton - Lecture 7:** Responsible AI	Incorporate Responsible AI (RAI) from the start of the development cycle, adhering to a set of AI trustworthy principles	Perspectives and challenges with RAI
11:15 am–12:15 pm	**Generative AI Challenges and Opportunities** Discussion centered on People-Process-Technology (e.g., ChatGPT, GPT-4, DALL-E 2, etc.)	Panel: Invited AI leaders speak on challenges and opportunities in the development and deployment of Generative AI	Panel discussion on the state of Generative AI: Capabilities, Issues, and looking ahead
12:15–1:00 pm	Hosted Lunch and Interaction with Invited Panel Members		
1:00–2:10 pm	**D. Martinez - Lecture 8:** Guidelines for deploying AI capabilities	Leverage 10 guidelines that incorporate people, processes, and technologies in the successful deployment of AI products and/or services	AI ecosystem environment from business needs to deployment
2:10–2:20 pm	Break		
2:20–5:00 pm	**Team Project:** Develop second draft of project strategic roadmap	Teams continue working on their respective AI projects	Complete strategic direction and AI value proposition, business needs (stakeholder requirements), and SWOT

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THURSDAY, Feb 01

	TOPIC	DESCRIPTION	HIGHLIGHTS
8:30–8:45 am	**D. Martinez - Welcome to Day 4:** Day 4 agenda and faculty Q&A	Day 4: What to expect	Address any clarification on prior lectures or course project
8:45–9:55 am	**D. Martinez - Lecture 9:** MLOps: transitioning from development into deployment	The foundational elements of MLOps, techniques, and contemporary tools	Tips and techniques in transitioning from development into operations
9:55–10:05 am	Break		
10:05–11:15 am	**D. Martinez - Lecture 10:** Fostering an innovative team environment	Identify a set of practical performance metrics for assessing the effectiveness and productivity of AI teams	Measuring what matters in AI technology-based organizations
11:15 am–12:00 pm	**D. Martinez - Lecture 11:** Leadership and resilience	Lead and manage high-technology teams	Characteristics of effective leaders
12:00–1:00 pm	Lunch Break		
1:00–2:10 pm	**D. Martinez – Q&A on topics discussed in prior lectures**	Opportunity to ask questions on any topic discussed in prior lectures	D. Martinez will also discuss ongoing advances in AI (particularly in the field of large language models)
2:10–2:20 pm	Break		
2:20–5:00 pm	**Team Project:** Develop final presentation of project strategic roadmap	Teams finalize their respective AI projects; review pre-recorded video on communicating effectively	Finalize AI team project presentations

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FRIDAY, Feb 02

	TOPIC	DESCRIPTION	HIGHLIGHTS
8:30–8:45 am	**D. Martinez - Welcome to Day 5:** Day 5 agenda and faculty Q&A	Day 5: What to expect	Address any clarification on prior lectures or course project
8:45–10:00 am	**D. Martinez - Lecture 12:** Putting it all together	Summary of all the topics covered in previous lectures serving as a quick reference guide for each of the participants	Lectures main takeaways
10:00–10:10 am	Break		
10:10–11:50 am	**Team Presentations:** Course projects	Teams present their course projects on mission/vision, envisioned future, strategic direction, AI value proposition, and business needs/SWOT analysis for a product or service	Duration: 15 minutes per team plus 5 minutes Q&A and feedback
11:50 am–12:45 pm	Lunch Break		
12:45–1:45 pm	**Team Presentations (continuation):** Course projects	Teams present their course projects on mission/vision, envisioned future, strategic direction, AI value proposition, and business needs/SWOT analysis for a product or service	Duration: 15 minutes per team plus 5 minutes Q&A and feedback
1:45–1:55 pm	Break		
1:55–3:00 pm	**D. Martinez - Course Wrap-Up**	Course completion is based on attending all 12 lectures and completing a presentation on team project	Certificate of completion plus group pictures