Data Science for Engineering Systems (DSES) MEng Program

Boost your engineering career in the age of data-centric AI

Congested urban systems, deteriorating infrastructure, failure-prone materials, and fragile supply chains are some of the major engineering challenges that our society faces today. The resulting societal costs are often compounded by global risks such as security threats, climate action failure, and public health crises. Tools and methods from data-driven analytics and computational modeling are aptly suited for developing new pathways to invest and plan for these risks and provide new engineering solutions for their quantitative assessment and effective management. This requires a solid technical, analytical and mathematical foundation that can be tailored to an industry-specific context, along with an appreciation of economic, environmental, and societal aspects. Fostering this combination of domain knowledge, methodological and technological expertise for data-driven decision-making in the context of societal-scale infrastructure systems is the basis of this new Master of Engineering (MEng) program.

Emerging career opportunities include: Data Scientist, Sustainability and Resilience Officer, Risk Analyst, Business Intelligence Developer, Urban Agriculturalist, Systems Architect, Supply Chain and Demand Modeler, Insurance Analytics, Urban Systems Innovator.

Concentration Areas
Students have the opportunity to tailor their coursework and thesis to develop expertise in one of the following concentration areas:

Computational Modeling and Design for Sustainability
In the Computational Modeling and Design for Sustainability concentration, students learn data-driven and computational methods to advance sustainable design techniques in the built environment. This concentration area provides opportunities to apply these tools to multi-scale design objectives spanning sustainable materials, resilient structures, and urban systems. Topics include:

- Multi-Scale Materials Design
- Energy Systems Planning and Operation
- Food Security and Sustainable Agriculture Technology
- Modeling and Mitigating Disease Transmission
- Data-driven nanotechnology for sustainable systems

Resilient Infrastructure Systems and Services
In the Resilient Infrastructure Systems and Services concentration, students learn how to leverage predictive analytics and data-driven decision making to enable smarter services, and increase their robustness and resiliency of our infrastructure systems. Topics include:

- Network Modeling and Resilient Systems
- Supply Chain Logistics
- Infrastructure Design for Climate Change
- Optimization of Structures
- Smart and Connected Cities

Coursework Criteria
Students are required to take 18 units of the following data science and machine learning subjects each term in addition to the coursework within their concentration area:

- 1.275 Business and Operations Analytics
- IDS.131 Statistics, Computation, Analytics
- 6.C51 Modeling with Machine Learning: from Algorithms to Applications + 1.C51 Machine Learning for Sustainable Systems (must be taken and completed simultaneously)
- 1.121 Advancing Mechanics and Materials via Machine Learning
- 1.125 Architecting and Engineering Software Systems

Coursework within the Computational Modeling and Design for Sustainability concentration, students must select 24 units of the following subjects:

- 1.545 Atomistic Modeling and Simulation of Materials and Structures
- 1.579 Materials in Agriculture, Food Security, and Food Safety
- 1.61 Transport Processes in the Environment

- 1.65 Atmospheric Boundary Layer Flows and Wind Energy
- 1.147 Startup Sustainable Tech
- 1.723 Computational Methods for Environmental Flows
- 1.631 Fluids and Diseases

Or

Coursework within the Resilient Infrastructure Systems and Services concentration, students must select 24 units of the following subjects:

- 1.208 Resilient Networks
- 1.260 Logistics Systems
- 1.303J Infrastructure Design for Climate Change
- 1.581 Structural Dynamics
- 1.583 Topology Optimization of Structures
- 1.200 Transportation: Foundations and Methods
- 1.202 Demand Modeling
- 1.266 Supply Chain and Demand Analytics
- 1.263 Urban Last-Mile Logistics

Learn from leaders and experts in the field
The 9-month Data Science for Engineering Systems degree program offers an accelerated, hands-on pathway that opens doors to emerging careers. Students are required to take project studio classes (6 units) that combine work in the lab with MIT faculty and seminars conducted by industry partners.

The program aims to advance students skillsets in data-driven modeling, analytics, and computational tools for a successful career in smart infrastructure and services, resilient systems design, and urban analytics.

Who should apply?
Recent graduates or practicing engineers or scientists with backgrounds in civil, environmental, mechanical, industrial, computer science, or another branch of engineering who wish to earn a professional Master of Engineering degree in preparation for an infrastructure data-driven engineering career in industry, private, or public sectors.

Application Deadline: December 1
Decision Notification: March
Applicant Decision Deadline: April 15

Questions: Contact cee-apo@mit.edu

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