

# MASTER OF SCIENCE IN ENGINEERING AND MANAGEMENT

System Design and Management Program (<https://catalog.mit.edu/interdisciplinary/graduate-programs/system-design-management>)

## Subject Requirements

Core		Units
EM.411	Foundations of System Design and Management	15
EM.412	Foundations of System Design and Management II	6
EM.413	Foundations of System Design and Management III	15
<b>Management Foundations<sup>1</sup></b>		<b>12</b>
<b>Engineering Depth<sup>1</sup></b>		<b>12</b>
<b>Management Electives<sup>1</sup></b>		<b>15</b>
<b>Engineering Electives<sup>1</sup></b>		<b>15</b>
<b>Thesis</b>		
EM.THG	EM Graduate Thesis	24
<b>Total Units</b>		<b>114</b>

<sup>1</sup> Choose subjects from the SDM restricted subjects lists.

### Management Foundations Subjects

1.266	Supply Chain and Demand Analytics <sup>1</sup>	6
15.034	Econometrics for Managers: Correlation & Causality in a Big Data World	9
15.071	The Analytics Edge	12
15.072	Advanced Analytics Edge	12
15.218	Global Economic Challenges and Opportunities	9
15.310	People, Teams, and Organizations	9
15.320	Strategic Organizational Design	9
15.364	Innovation Ecosystems for Regional Entrepreneurship Acceleration Leaders (iEco4REAL)	9
15.374	Organizing for Innovation	6
15.394	Entrepreneurial Founding and Teams	9
15.401	Managerial Finance	9
15.431	Entrepreneurial Finance and Venture Capital	9
15.439	Quantitative Investment Management	9
15.515	Financial Accounting	9
15.516	Corporate Financial Accounting	12
15.521	Accounting Information for Decision Makers	6

15.535	Business Analysis Using Financial Statements	9
15.665	Power and Negotiation	9
15.761	Introduction to Operations Management	9
15.768	Management of Services: Creating Value for Customers, Employees, and Investors	9
15.762[[]]	Supply Chain Analytics <sup>1</sup>	12
15.774	The Analytics of Operations Management	12
15.814	Marketing Innovation	9
15.818	Pricing	6
15.833	Business-to-Business Marketing	6
15.871	Introduction to System Dynamics	6
15.873	System Dynamics for Business and Policy	9
15.900	Competitive Strategy	9
15.910	Innovation Strategy	6
15.911	Entrepreneurial Strategy	9
15.915	Business Strategies for a Sustainable Future	9
15.C57[[]]	Optimization Methods <sup>1</sup>	12
EM.S21	Special Subject in Engineering Management <sup>1</sup>	

<sup>1</sup> Units are split between engineering depth and management foundation subjects. Splits vary based on the subject and unit value.

### Engineering Depth Subjects

1.200[[]]	Transportation: Foundations and Methods	12
1.266	Supply Chain and Demand Analytics <sup>1</sup>	6
2.702	Systems Engineering and Naval Ship Design	12
2.83	Energy, Materials and Manufacturing	12
2.854	Introduction to Manufacturing Systems	12
6.5840	Distributed Computer Systems Engineering	12
6.5900	Computer System Architecture	12
16.391	Statistics for Engineers and Scientists	12
15.C57[[]]	Optimization Methods <sup>1</sup>	12
15.762[[]]	Supply Chain Analytics <sup>1</sup>	12
16.453[[]]	Human Systems Engineering	12
16.863[[]]	System Safety Concepts	12
EM.422	System Design and Management for a Changing World: Combined	12

EM.423[J]	System Design and Management for a Changing World: Tools	6	15.286	Communicating with Data	6
EM.424[J]	System Design and Management for a Changing World: Projects	6	15.318	Discovering Your Leadership Signature	9
EM.S21	Special Subject in Engineering Management <sup>1</sup>		15.321	Improvisational Leadership: In-the-Moment Leadership Skills	6
<sup>1</sup> Units are split between engineering depth and management foundations. Splits vary based on the subject and unit value.					
<b>Management Electives</b>					
<i>Managerial Economics</i>					
15.308	Leading the Way: Interpersonal and Organizational Strategies for Advancing DE&I	9			
<i>Operations Research/Statistics</i>					
15.068	Statistical Consulting	9			
15.095	Machine Learning Under a Modern Optimization Lens	12			
<i>Health Care Management</i>					
15.128[J]	Revolutionary Ventures: How to Invent and Deploy Transformative Technologies	9			
15.141[J]	Economics of Health Care Industries	6			
<i>Global Economics and Management</i>					
15.216	Central Banks, Monetary Policy and Global Financial Markets	9			
15.223	Global Markets, National Policies and the Competitive Advantages of Firms	6			
15.226	Modern Business in Southeast Asia: ASEAN Lab	12			
15.232	Breakthrough Ventures: Effective Business Models in Frontier Markets	6			
15.235	Blockchain and Money	6			
15.236	Global Business of Artificial Intelligence and Robotics (GBAIR)	6			
15.248	MENA Lab: Promoting Innovation & Entrepreneurship in the Middle East and North Africa	12			
<i>History, Environment, Ethics</i>					
15.269	Leadership Stories: Literature, Ethics, and Authority	9			
<i>Communication</i>					
15.270	Ethical Practice: Leading Through Professionalism, Social Responsibility, and System Design	6			
15.281	Advanced Leadership Communication	9			
15.283	Social Media Management: Persuasion in Networked Culture	9			
			<i>Work and Organizational Studies</i>		
			15.318 Discovering Your Leadership Signature 9		
			15.321 Improvisational Leadership: In-the-Moment Leadership Skills 6		
			<i>Technology, Innovation, and Entrepreneurship</i>		
			15.365 Overcoming Obstacles to Entrepreneurial Success 9		
			15.366 Climate & Energy Ventures 12		
			15.367[J] Healthcare Ventures 12		
			15.369 Entrepreneurship in Organizations 9		
			15.375[J] Global Ventures 12		
			15.376[J] AI for Impact: Solving Societal-Scale Problems 9		
			15.378 Building an Entrepreneurial Venture: Advanced Tools and Techniques 12		
			15.385 Innovating for Impact 6		
			15.386 Leading in Ambiguity: Steering Through Strategic Inflection Points 6		
			15.387 Entrepreneurial Sales 12		
			15.388 Venture Creation Tactics 12		
			15.389 Global Entrepreneurship Lab 12		
			15.390 Entrepreneurship 101: Systematic Approach to New Venture Creation 12		
			15.392 Scaling Entrepreneurial Ventures 6		
			15.398 Corporations at the Crossroads: Leading an Organization Through Change & Challenge 6		
			15.399 Entrepreneurship Lab 12		
<i>Finance</i>					
			15.402 Corporate Finance 9		
			15.426[J] Real Estate Finance and Investment 12		
			15.434 Advanced Corporate Finance 9		
			15.437 Options and Futures Markets 9		
			15.451 Proseminar in Capital Markets/Investment Management 6		
			15.453 Finance Lab 9		
			15.456 Financial Engineering 9		
			15.458 Financial Data Science and Computing 9		
			15.492 Practice of Finance: Crypto Finance 6		
			15.497 FinTech Ventures 9		
			15.499 Practice of Finance: Social Impact Investing 9		
<i>Information Technologies</i>					
			15.561 Digital Revolution: From Foundations to Future Trends 9		

15.562	Web3 and Strategy: Blockchain, Metaverse, and NFT Essentials	6	1.286[[]]	Urban Energy Systems and Policy	12
15.567	The Economics of Information: Strategy, Structure and Pricing	6	1.472[[]]	Innovative Project Delivery in the Public and Private Sectors	6
15.570	Digital Marketing and Social Media Analytics	6	1.541	Mechanics and Design of Concrete Structures	12
15.572	Analytics Lab: Action Learning Seminar on Analytics, Machine Learning, and the Digital Economy	9	1.573[[]]	Structural Mechanics	12
<i>Law</i>			1.818[[]]	Sustainable Energy	12
15.615	Essential Law for Business	9	<i>Mechanical Engineering</i>		
15.655[[]]	Law, Technology, and Public Policy	12	2.096[[]]	Introduction to Modeling and Simulation	12
<i>Industrial Relations and Human Resources</i>			2.111[[]]	Quantum Computation	12
15.661	Building Successful Careers and Organizations	6	2.120	Introduction to Robotics	12
15.662[[]]	People and Profits: Shaping the Future of Work	12	2.131	Advanced Instrumentation and Measurement	12
15.669	Strategies for People Analytics	6	2.140	Analysis and Design of Feedback Control Systems	12
15.677[[]]	Labor Markets and Employment Policy	12	2.151	Advanced System Dynamics and Control	12
<i>Operations Management</i>			2.154	Maneuvering and Control of Surface and Underwater Vehicles	12
15.764[[]]	The Theory of Operations Management	12	2.156	Artificial Intelligence and Machine Learning for Engineering Design	12
15.769	Operations Strategy	9	2.160	Identification, Estimation, and Learning	12
15.777	Healthcare Lab: Introduction to Healthcare Delivery in the United States	15	2.165[[]]	Robotics	12
15.784	Operations Laboratory	9	2.183[[]]	Biomechanics and Neural Control of Movement	12
15.785	Product Management	6	2.22	Design Principles for Ocean Vehicles	12
<i>Marketing</i>			2.42	General Thermodynamics	12
15.815	Applied Behavioral Economics	9	2.55	Advanced Heat and Mass Transfer	12
15.819	Marketing and Product Analytics	9	2.62[[]]	Fundamentals of Advanced Energy Conversion	12
15.846	Branding	6	2.680	Unmanned Marine Vehicle Autonomy, Sensing, and Communication	12
15.847[[]]	Consumer Behavior	9	2.720	Elements of Mechanical Design	12
<i>System Dynamics</i>			2.737	Mechatronics	12
15.878	Sustainable Business Lab	9	2.740	Bio-inspired Robotics	12
<b>Engineering Electives</b>			2.75[[]]	Medical Device Design	12
<i>Civil and Environmental Engineering</i>			2.76	Global Engineering	12
1.001	Engineering Computation and Data Science	12	2.782[[]]	Design of Medical Devices and Implants	12
1.125	Architecting and Engineering Software Systems	12	2.788	Mechanical Engineering and Design of Living Systems	12
1.208	Resilient Networks	12	2.798[[]]	Molecular, Cellular, and Tissue Biomechanics	12
1.261[[]]	Case Studies in Logistics and Supply Chain Management	6	2.810	Manufacturing Processes and Systems	12
1.263[[]]	Urban Last-Mile Logistics	6	2.821[[]]	Structural Materials	12
1.275[[]]	Business and Operations Analytics	6			

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2.83	Energy, Materials and Manufacturing	12	6.7410	Principles of Digital Communication	12
2.888	Professional Seminar in Global Manufacturing Innovation and Entrepreneurship	3	6.7810	Algorithms for Inference	12
2.98	Sports Technology: Engineering & Innovation	6	6.7910[[]]	Statistical Learning Theory and Applications	12
<i>Materials Science and Engineering</i>					
3.207	Innovation and Commercialization	12	6.8110[[]]	Cognitive Robotics	12
3.22	Structure and Mechanics of Materials	12	6.7900	Machine Learning	12
3.371[[]]	Structural Materials	12	6.7910[[]]	Statistical Learning Theory and Applications	12
3.560	Industrial Ecology of Materials	12	6.7930[[]]	Machine Learning for Healthcare	12
3.70	Materials Science and Engineering of Clean Energy	12	6.8210	Underactuated Robotics	12
3.963[[]]	Biomaterials Science and Engineering	12	6.8110[[]]	Cognitive Robotics	12
<i>Electrical Engineering and Computer Science</i>					
6.3102	Dynamical System Modeling and Control Design	12	6.8210	Underactuated Robotics	12
6.3702	Introduction to Probability	12	6.8300	Advances in Computer Vision	12
6.3952	AI, Decision Making, and Society	12	6.8420	Computational Design and Fabrication	12
6.4132[[]]	Principles of Autonomy and Decision Making	12	6.8510	Intelligent Multimodal User Interfaces	12
6.4822[[]]	Quantitative Physiology: Organ Transport Systems	12	6.8610	Quantitative Methods for Natural Language Processing	12
6.4832[[]]	Fields, Forces, and Flows in Biological Systems	12	6.8620[[]]	Spoken Language Processing	12
6.4861[[]]	Medical Device Design	12	6.8800[[]]	Biomedical Signal and Image Processing	12
6.5080	Multicore Programming	12	<i>Chemical Engineering</i>		
6.5160[[]]	Classical Mechanics: A Computational Approach	12	10.392[[]]	Fundamentals of Advanced Energy Conversion	12
6.5400[[]]	Theory of Computation	12	10.524	Pharmaceutical Engineering	9
6.5610	Applied Cryptography and Security	12	10.53[[]]	Advances in Biomanufacturing	3
6.5660	Computer Systems Security	12	10.551	Systems Engineering	9
6.5810	Operating System Engineering	12	10.552	Modern Control Design	9
6.5820	Computer Networks	12	10.595	Molecular Design and Bioprocess Development of Immunotherapies	9
6.5830	Database Systems	12	10.626	Electrochemical Energy Systems	12
6.5940	TinyML and Efficient Deep Learning Computing	12	<i>Aeronautics and Astronautics</i>		
6.6010	Analysis and Design of Digital Integrated Circuits	12	16.31	Feedback Control Systems	12
6.6020	High-Frequency Integrated Circuits	12	16.32	Principles of Optimal Control and Estimation	12
6.6300	Electromagnetics	12	16.363	Communication Systems and Networks	12
6.6330	Fundamentals of Photonics	12	16.422	Human Supervisory Control of Automated Systems	12
6.6400	Applied Quantum and Statistical Physics	12	16.423[[]]	Aerospace Biomedical and Life Support Engineering	12
6.6500[[]]	Integrated Microelectronic Devices	12	16.511	Aircraft Engines and Gas Turbines	12
6.7300[[]]	Introduction to Modeling and Simulation	12	16.512	Rocket Propulsion	12
			16.522	Space Propulsion	12
			16.851	Introduction to Satellite Engineering	6
			16.885	Aircraft Systems Engineering	12
			16.89[[]]	Space Systems Engineering	12

16.895[J]	Engineering Apollo: The Moon Project as a Complex System	12	15.379[J]	Mobility Ventures: Driving Innovation in Transportation Systems	12
<i>Biological Engineering</i>			15.480[J]	Science and Business of Biotechnology	9
20.201	Fundamentals of Drug Development	12	15.563[J]	Artificial Intelligence for Business	9
20.203[J]	Neurotechnology in Action	12	15.657[J]	Technology, Globalization, and Sustainable Development	12
20.405[J]	Principles of Synthetic Biology	12	15.770[J]	Logistics Systems	12
20.410[J]	Molecular, Cellular, and Tissue Biomechanics	12	15.783[J]	Product Design and Development	12
20.420[J]	Principles of Molecular Bioengineering	12	16.855[J]	Systems Architecting Applied to Enterprises	12
20.445[J]	Methods and Problems in Microbiology	12	16.891	Space Policy Seminar	6
20.463[J]	Biomaterials Science and Engineering	12	EM.425	Research Seminar on Engineering Projects and Teamwork	6
20.554[J]	Advances in Chemical Biology	12	EM.426	Model-building and Analysis Lab for Engineering Project Teamwork	6
<i>Nuclear Science and Engineering</i>			EM.427[J]	Technology Roadmapping and Development	12
22.13	Nuclear Energy Systems	6	SCM.256	Data Science and Machine Learning for Supply Chain Management	12
22.55[J]	Radiation Biophysics	12	SCM.290	Sustainable Supply Chain Management	6
22.611[J]	Introduction to Plasma Physics I	12			
22.811[J]	Sustainable Energy	12			
<i>Institute for Data, Systems and Society</i>					
IDS.131[J]	Statistics, Computation and Applications	12			
IDS.521[J]	Energy Systems for Climate Change Mitigation	12			
IDS.522	Mapping and Evaluating New Energy Technologies	12			

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#### Engineering and Management Electives—Split Credits

6.7700[J]	Fundamentals of Probability	12
6.9820	Practical Internship Experience	1
15.029[J]	United States Energy Policy: Lessons Learned for the Future	6
15.032[J]	Engineering, Economics and Regulation of the Electric Power Sector	12
15.054[J]	The Airline Industry	12
15.070[J]	Discrete Probability and Stochastic Processes	12
15.081[J]	Introduction to Mathematical Programming	12
15.084[J]	Nonlinear Optimization	12
15.085[J]	Fundamentals of Probability	12
15.094[J]	Robust Modeling, Optimization, and Computation	12
15.136[J]	Principles and Practice of Drug Development	9
15.371[J]	Innovation Teams	12