

IDM Management [Foundation](#) and Elective Course List

Effective: 11/2/18

- [15.011 Economic Analysis for Business Decisions](#)
- 15.025 Game Theory for Strategic Advantage
- *15.027 Business Opportunities in Developing Economies
- [15.034 Metrics for Managers](#)
- 15.038 Energy Economics and Policy
- 15.068 Statistical Consulting
- [15.071 The Analytics Edge](#)
- 15.079 Introduction to Applied Probability
- 15.082 Network Optimization
- 15.122 Critical Reading and Technical Assessment of Biomedical Information
- 15.124 Evaluating a Biomedical Business Concept
- 15.128 Revolutionary Ventures
- 15.132 Medicine for Managers and Entrepreneurs
- 15.137 Case Studies and Strategies in Drug Discovery and Development
- 15.225 Economy and Business in Modern China and India: China Lab and India Lab
- 15.232 Effective Business Models in Frontier Markets
- 15.248 Israel Lab
- 15.269 Leadership Stories: Literature, Ethics, and Authority
- 15.270 Leading Through Professionalism, Social Responsibility, and System Design
- 15.281 Advanced Leadership Communication
- 15.282 Enacting leadership: Shakespeare & Performance
- 15.283 Social Media Management: Persuasion in Networked Culture
- 15.286 Communicating with Data
- [15.310 Managerial Psychology](#)
- 15.318 Discovering Your Ldrshp Signature
- [15.320 Strategic Organizational Design](#)
- 15.321 Improvisational Leadership
- 15.356 Prod & Srvc Dev in Internet Age
- [15.358 Software & Internet Entrepreneurship](#)
- 15.363 Strategic Decision making in the Life Sciences
- [15.364 Regional Entrepreneurship Acceleration Lab](#)
- 15.366 Energy Ventures
- 15.367 Healthcare Ventures
- 15.369 Seminar in Corporate Entrepreneurship
- 15.372 Experimental Innovation Lab
- 15.375 Development Ventures
- 15.376 Media Ventures
- 15.378 Building an Entrepreneurial Venture: Advanced Tools and Techniques
- 15.385 Social Innovation and Entrepreneurship a.k.a. SOI
- 15.386 Managing in Adversity
- 15.387 Entrepreneurial Sales

15.389 Global Entrepreneurship Lab
15.390 New Enterprises
15.392 Scaling Entrepreneurial Ventures
[15.394 Dilemmas in Founding New Ventures](#)
15.395 Entrepreneurship Without Borders
15.398 Corporations at the Crossroads: The CEO Perspective
15.399 Entrepreneurship Lab
[15.401 Managerial Finance](#)
15.402 Corporate Finance
15.426 Real Estate Finance and Investment
[15.431 Entrepreneurial Finance & Venture Capital](#)
[15.439 Investment Management](#)
*15.451 Proseminar in Capital Markets/Investment Management
15.497 FinTech Ventures
[15.515 Financial Acct](#)
[15.516 Corp Financial Acct](#)
[15.521 Mngmt Acct & Control](#)
[15.535 Business Analysis Using Financial Statements](#)
15.567 Economics of Information: Strategy, Structure and Pricing
[15.569 Leadership Lab](#)
15.570 Digital Marketing & Social Media
15.571 Enterprise Transformations in Dig Econ
15.572 Analytics Lab
15.580 Seminar in Information Technology: Cybersecurity (Spring 2018 only)
15.615 Basic Business Law for the Entrepreneur and Manager
15.662 Managing Sustainable Businesses for People and Profits
[15.665 Power & Negotiation](#)
*15.669 Strategies for People Analytics
15.677 Urban Labor Markets and Employment Policy
15.678 Political Economy I: Theories of the State and the Economy
[15.761 Intro to Ops Mngmt](#)
15.764 Theory of Ops Management
15.769 Ops Strategy
[15.774 The Analytics of Operations Management](#)
15.775 Analytics Proseminar
15.784 Operations Lab
15.785 Digital Product Management
[15.795 Behavioral Decision Theories & Applications](#)
[15.810 Marketing Management](#)
[15.818 Pricing](#)
[15.821 Listening to the Customer](#)
[15.822 Strat Market Mngmt](#)
15.828 Product Management
[15.833 Bus-to-bus Mrktg](#)
[15.835 Entrepreneurial Marketing](#)
15.846 Branding

15.847 Consumer Behavior
15.871 Intro to Sys Dyn I
15.872 Intro to Sys Dyn II
*15.878 Capstone Seminar in Sustainability
15.900 Competitive Strategy
15.904 Advanced Strategic Management
15.910 Innovation Strategy
15.911 Entrepreneurial Strategy
15.912 Strat Mngmt of Innov & Entrprnrshp
15.913 Strat for Sustainable Bus
15.914 Competitive Dynamics and Strategy
15.915 Laboratory for Sustainable Business
15.933 Strategic Opportunities in Energy
*15.S12 Blockchain & Money (Fall 2018 only)

Classes listed jointly in the SoE and Sloan

The following are a set of classes that are currently J-listed across the SoE and the Sloan School and that qualify for credit toward an IDM degree. Each of these courses includes substantial content in both engineering and management. Students taking these courses should count half of the units toward engineering requirements and half toward management requirements. For example, a student completing Course 16.71[J]/15.054[J], The Airline Industry, will receive 6 units of engineering elective credit and 6 units of management elective credit. A student completing Course 15.762[J]/1.273[J], Supply Chain Planning, will receive 3 units of management foundation credit and 3 units of engineering foundation credit.

**Unless otherwise noted with ** all course units split evenly. Exceptions include 15.480, 15.565, and 6.928- see below.

The following 3 courses have been approved for split **Foundation** credit (half Engineering Foundation, half Management Foundation):

15.093[J] Optimization Methods

Same subject as 6.255[J], IDS.200[J] Prereq: 18.06 G 4-0-8 units

Introduces the principal algorithms for linear, network, discrete, robust, nonlinear, dynamic optimization and optimal control. Emphasizes methodology and the underlying mathematical structures. Topics include the simplex method, network flow methods, branch and bound and cutting plane methods for discrete optimization, optimality conditions for nonlinear optimization, interior point methods for convex optimization, Newton's method, heuristic methods, and dynamic programming and optimal control methods.

15.762[J] Supply Chain Planning

Same subject as 1.273[J], IDS.150[J] Prereq: 1.260[J] or 15.761 G 2-0-4 units

Focuses on effective supply chain strategies for companies that operate globally, with emphasis on how to plan and integrate supply chain components into a coordinated system. Students are exposed to concepts and models important in supply chain planning with emphasis on key

tradeoffs and phenomena. Introduces and utilizes key tactics such as risk pooling and inventory placement, integrated planning and collaboration, and information sharing. Lectures, computer exercises, and case discussions introduce various models and methods for supply chain analysis and optimization. Recommended for Operations Management concentrators. First half-term subject.

15.763[J] Manufacturing System and Supply Chain Design

Same subject as 1.274[J], IDS.151[J] Prereq: 1.260[J], 15.761, or 15.778 G (Spring) 2-0-4 units
Focuses on decision making for system design, as it arises in manufacturing systems and supply chains. Students exposed to frameworks and models for structuring the key issues and trade-offs. Presents and discusses new opportunities, issues and concepts introduced by the internet and e-commerce. Introduces various models, methods and software tools for logistics network design, capacity planning and flexibility, make-buy, and integration with product development. Industry applications and cases illustrate concepts and challenges. Recommended for Operations Management concentrators. Second half-term subject.

The following courses on this and subsequent pages have been approved for split **Elective** credit:

15.017[J] Engineering, Economics and Regulation for Energy Access in Developing Countries
Examines the technical, economic, political and social trade-offs inherent in designing energy solutions that can ensure universal access to electricity - as well as modern technologies for heating and cooking - in developing countries. Presents the characteristic features of the power sectors in these countries and how they need specific technical, financial and regulatory approaches. Focuses on the identification and design of viable business models that can attract the large volume of private investment needed to achieve universal energy access. Covers adequate power sector regulation and computer-aided electrification planning techniques in detail. Students make use of these models and discuss practical case examples.
Same subject as [6.934\[J\]](#); Prereq: None, Units: 3-0-9

15.054 [J] The Airline Industry

Prereq: None 12 Units

Overview of the global airline industry, focusing on recent industry performance, current issues and challenges for the future. Fundamentals of airline industry structure, airline economics, operations planning, safety, labor relations, airports and air traffic control, marketing, and competitive strategies, with an emphasis on the interrelationships among major industry stakeholders. Recent research findings of the MIT Global Airline Industry Program are showcased, including the impacts of congestion and delays, evolution of information technologies, changing human resource management practices, and competitive effects of new entrant airlines. Taught by faculty participants of the Global Airline Industry Program.
Same subject as [1.232\[J\]](#), [16.71\[J\]](#), G

15.062[J] Data Mining: Finding the Data and Models that Create Value

Same subject as IDS.145

Subject meets with 15.0621 Prereq: 15.060 or 15.075[J] G (second half of term) 2-0-4 units

Provides an introduction to data mining and machine learning, a class of methods that assist in recognizing patterns and making intelligent use of massive amounts of data collected via the internet, e-commerce, electronic banking, point-of-sale devices, bar-code readers, medical databases, search engines, and social networks. Includes topics in logistic regression, association rules, tree-structured classification and regression, cluster analysis, discriminant analysis, and neural network methods. Presents examples of successful applications in areas such as credit ratings, fraud detection, marketing, customer relationship management, and investments. Introduces data-mining software. Term project required. Meets with 15.0621 when offered concurrently. Students taking graduate version complete additional assignments.

15.066[J] System Optimization and Analysis for Operations

Same subject as 2.851[J], Prereq: Calculus II (GIR) G 4-0-8 units

Introduction to mathematical modeling, optimization, and simulation, as applied to manufacturing. Specific methods include linear programming, network flow problems, integer and nonlinear programming, discrete-event simulation, heuristics and computer applications for manufacturing processes and systems. Restricted to Leaders for Global Operations students.

15.070[J] Advanced Stochastic Processes

Same subject as 6.265[J] Prereq: 6.431, 15.085[J], 18.100A, 18.100B, or 18.100C G 3-0-9 units

Analysis and modeling of stochastic processes. Topics include measure theoretic probability, martingales, filtration, and stopping theorems; elements of large deviations theory; Brownian motion and reflected Brownian motion; stochastic integration and Ito calculus; functional limit theorems. Applications to finance theory, insurance, queueing and inventory models.

15.073[J] Logistical and Transportation Planning Methods

Prereq: 6.041 12 Units

Quantitative techniques of operations research with emphasis on applications in transportation systems analysis (urban, air, ocean, highway, and pickup and delivery systems) and in the planning and design of logistically oriented urban service systems (e.g., fire and police departments, emergency medical services, and emergency repair services). Unified study of functions of random variables, geometrical probability, multi-server queueing theory, spatial location theory, network analysis and graph theory, and relevant methods of simulation. Computer exercises and discussions of implementation difficulties.

Same subject as 1.203[J], 16.76[J], G

15.077[J] Statistical Learning and Data Mining

Same subject as IDS.211 Prereq: 6.431, 15.085[J], or 18.600; 18.06 or 18.700 G (Spring) 4-0-8 units

Advanced introduction to the theory and application of statistics, data-mining, and machine learning, concentrating on techniques used in management science, marketing, finance, consulting, engineering systems, and bioinformatics. First half builds the statistical foundation for the second half, with topics selected from sampling, including the bootstrap, theory of estimation, testing, nonparametric statistics, analysis of variance, categorical data analysis, regression analysis, MCMC, EM, Gibbs sampling, and Bayesian methods. Second half focuses

on data mining, supervised learning, and multivariate analysis. Topics selected from logistic regression; principal components and dimension reduction; discrimination and classification analysis, including trees (CART), partial least squares, nearest neighbors, regularized methods, support vector machines, boosting and bagging, clustering, independent component analysis, and nonparametric regression. Uses statistics software packages, such as R and MATLAB for data analysis and data mining. Includes a term project.

15.081[J] Introduction to Mathematical Programming

Prereq: 18.06 12 Units

Introduction to linear optimization and its extensions emphasizing both methodology and the underlying mathematical structures and geometrical ideas. Covers classical theory of linear programming as well as some recent advances in the field. Topics: simplex method; duality theory; sensitivity analysis; network flow problems; decomposition; integer programming; interior point algorithms for linear programming; and introduction to combinatorial optimization and NP-completeness.

Same subject as 6.251[J] G

15.083[J] Integer Programming and Combinatorial Optimization

Same subject as 6.859[J] Prereq: 15.081[J] or permission of instructor Acad Year 2016-2017: Not offered

Acad Year 2017-2018: G 4-0-8 units

In-depth treatment of the modern theory of integer programming and combinatorial optimization, emphasizing geometry, duality, and algorithms. Topics include formulating problems in integer variables, enhancement of formulations, ideal formulations, integer programming duality, linear and semidefinite relaxations, lattices and their applications, the geometry of integer programming, primal methods, cutting plane methods, connections with algebraic geometry, computational complexity, approximation algorithms, heuristic and enumerative algorithms, mixed integer programming and solutions of large-scale problems.

15.084[J] Nonlinear Optimization

Prereq: 18.06; 18.100A, 18.100B, or 18.100C 12 Units

Unified analytical and computational approach to nonlinear optimization problems.

Unconstrained optimization methods include gradient, conjugate direction, Newton, sub-gradient and first-order methods. Constrained optimization methods include feasible directions, projection, interior point methods, and Lagrange multiplier methods. Convex analysis, Lagrangian relaxation, nondifferentiable optimization, and applications in integer programming. Comprehensive treatment of optimality conditions and Lagrange multipliers. Geometric approach to duality theory. Applications drawn from control, communications, power systems, and resource allocation problems.

Same subject as 6.252[J] G

15.085[J] Fundamentals of Probability

Prereq: Calculus II (GIR) 12 Units

Introduction to probability theory. Probability spaces and measures. Discrete and continuous random variables. Conditioning and independence. Multivariate normal distribution. Abstract integration, expectation, and related convergence results. Moment generating and characteristic

functions. Bernoulli and Poisson process. Finite-state Markov chains. Convergence notions and their relations. Limit theorems. Familiarity with elementary notions in probability and real analysis is desirable.

Same subject as 6.436[J] G

15.094[J] Robust Modeling, Optimization, and Computation

Same subject as 1.142[J] Prereq: 18.06 or permission of instructor G 4-0-8 units

Introduces modern robust optimization, including theory, applications, and computation. Presents formulations and their connection to probability, information and risk theory for conic optimization (linear, second-order, and semidefinite cones) and integer optimization. Application domains include analysis and optimization of stochastic networks, optimal mechanism design, network information theory, transportation, pattern classification, structural and engineering design, and financial engineering. Students formulate and solve a problem aligned with their interests in a final project.

*15.136[J] Principles and Practice of Drug Development

Description and critical assessment of the major issues and stages of developing a pharmaceutical or biopharmaceutical. Drug discovery, preclinical development, clinical investigation, manufacturing and regulatory issues considered for small and large molecules. Economic and financial considerations of the drug development process. Multidisciplinary perspective from faculty in clinical; life; and management sciences; as well as industry guests.

Same subject as [7.547\[J\]](#), [10.547\[J\]](#), [HST.920\[J\]](#), [IDS.620\[J\]](#)

Prereq: Permission of instructor

Units: 3-0-6 (Units will be split 6 as management elective, 3 as engineering elective (not vice versa))

15.371[J] Innovation Teams

Same subject as 10.807[J] Prereq: 15.911 or permission of instructor G 4-4-4 units

Students work in teams to develop commercialization strategies for innovative research projects generated in MIT laboratories. Projects cover critical aspects of commercialization, from selecting the target application and market for the technology to developing an intellectual property strategy and performing a competitive analysis. Instruction provided in communication and teamwork skills, as well as analysis of the challenges and benefits of technology transfer. Includes lectures, guest speakers, and extensive team coaching. Designed primarily for students in engineering, science, and management. Applications, resumes, and a brief statement of interest are required prior to registration.

15.377[J] Linked Data Ventures

Prereq: 6.005, 6.033, or permission of instructor 12 Units; Same subject as 6.932[J] G

Provides practical experience in the use and development of semantic web technologies. Focuses on gaining practical insight from executives and practitioners who use these technologies in their companies. Working in multidisciplinary teams, students complete a term project to develop a sustainable prototype. Concludes with a professional presentation, judged by a panel of experts, and a technical presentation to faculty.

15.428[J] Tools for Analysis: Design for Real Estate and Infrastructure Development

Prereq: None 6 Units

Introduction to analytical tools to support design and decision-making in real estate, infrastructure development, and investment. Particular focus on identifying and valuing sources of flexibility using "real options," Monte-Carlo simulation, and other techniques from the field of engineering systems. Integrates economic and engineering perspectives, and is suitable for students with various backgrounds. Provides useful preparation for thesis work in the area. Same subject as 11.434[J], IDS.671 G

**15.480[J] Science and Business of Biotechnology

(Same subject as 7.546[J], 20.586[J])

Prereq: Permission of instructor; Coreq: 15.401

Units: 3-0-6 (Units will be split 6 as management elective, 3 as engineering elective (not vice versa))

Covers the new types of drugs and other therapeutics in current practice and under development, the financing and business structures of early-stage biotechnology companies, and the evaluation of their risk/reward profiles. Includes a series of live case studies with industry leaders of both established and emerging biotechnology companies as guest speakers, focusing on the underlying science and engineering as well as core financing and business issues. Students must possess a basic background in cellular and molecular biology.

**15.565[J] Digital Evolution: Managing Web 3.0

(Same subject as IDS.345[J])

Prereq: Permission of instructor

Units: 3-0-6 (Student may choose to apply 6 units to management elective and 3 units to engineering elective, or vice versa (student's choice)).

Examines the evolution from Web 2.0, with its emphasis on interactivity through online collaboration and sharing among users (primarily through social networking sites, wikis and communication tools), to Web 3.0, which focuses on high proactivity, transforming the Web into a database, and the leveraging of artificial intelligence technologies, such as the Semantic Web. Introduces Management 3.0 and the range of new Web technologies, applications, and business opportunities and challenges that it supports. Addresses topics such as big data, cloud computing, and cybersecurity. Includes case studies, industry and academic speakers, discussion of basic principles, and a team project.

15.657[J] Technology, Globalization, and Sustainable Development

Prereq: Permission of instructor 12 Units

Investigates sustainable development, taking a broad view to include not only a healthy economic base, but also a sound environment, stable employment, adequate purchasing power, distributional equity, national self-reliance, and maintenance of cultural integrity. Explores national, multinational, and international political and legal mechanisms to further sustainable development through transformation of the industrial state. Addresses the importance of technological innovation and the financial crisis of 2008.

Same subject as 1.813[J], 11.466[J], IDS.437[J] G

15.765[J] Global Supply Chain Management

Prereq: 1.260[J], 1.261[J], 15.761, 15.778, or permission of instructor 6 Units

Focuses on the planning, processes, and activities of supply chain management for companies involved in international commerce. Students examine the end-to-end processes and operational challenges in managing global supply chains, such as the basics of global trade, international transportation, duty, taxes, trade finance and hedging, currency issues, outsourcing, cultural differences, risks and security, and green supply chains issues. Highly interactive format features student-led discussions, staged debates, and a mock trial. Includes assignments on case studies and sourcing analysis, as well as projects and a final exam. Same subject as 1.265[J], 2.965[J], SCM.265[J] G

15.770[J] Logistics Systems

Same subject as 1.260[J], IDS.730, SCM.260 Prereq: Permission of instructor G 3-0-9 units Provides an introduction to supply chain management from both analytical and practical perspectives. Taking a unified approach, students develop a framework for making intelligent decisions within the supply chain. Covers key logistics functions, such as demand planning, procurement, inventory theory and control, transportation planning and execution, reverse logistics, and flexible contracting. Explores concepts such as postponement, portfolio management, and dual sourcing. Emphasizes skills necessary to recognize and manage risk, analyze various tradeoffs, and model logistics systems.

**6.928[J] Leading Creative Teams

(Same subject as 16.990[J]/15.S67 (spring 2018))

Prereq: None

Units: 3-0-6 (Units will be split 6 as management elective, 3 as engineering elective (not vice versa))

Prepares students to lead teams charged with developing creative solutions in engineering and technical environments. Grounded in research but practical in focus, equips students with leadership competencies such as building self-awareness, motivating and developing others, creative problem solving, influencing without authority, managing conflict, and communicating effectively. Teamwork skills include how to convene, launch, and develop various types of teams, including project teams. Learning methods emphasize personalized and professional skill development.

SCM.290 Sustainable Supply Chain Management

first half of term

Prereq: None

Units: 3-0-3

Introduces operational aspects of sustainable supply chains. Focuses on analyzing the implications of environmental considerations in logistics decisions. Topics include carbon footprint, sustainable logistics, closed-loop supply chains, reverse logistics, and sustainable supply chain strategy. Includes a team project that evaluates the sustainable supply chain strategy of an industry or a publicly-traded company.