

Industrial & Systems Engineering

THE DANIEL J. EPSTEIN DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING



Industrial & Systems Engineers work to improve processes, systems, and organizations. They are productivity catalysts, managing the combination of physical, capital, and human resources needed to produce and deliver valuable goods and services. An Industrial & Systems Engineering (ISE) education provides the skills and foundations to design, analyze, and optimize complex systems.

MAJOR

- ➔ Industrial & Systems Engineering

WE ENGINEER BETTER BUSINESSES

Industrial & Systems engineers are consummate economic competitors who focus on developing and controlling manufacturing, production, inventory, distribution, service, and management information systems to ensure their companies' success in the global marketplace.

On the job, these engineering professionals optimize the use of scarce resources by integrating people and technology to maximize productivity, minimize cost, improve processes, and maintain high standards of quality.

USC's undergraduate ISE curricula prepare students for careers in a wide-range of industries, consulting, or professional engineering practice, and are also an excellent intellectual foundation for advanced degrees in fields as diverse as Engineering, Logistics, Business Administration, Finance, Medicine, Law, or Public Policy.

RESEARCH

We advance and define research frontiers that benefit society through innovation of systems, algorithms, and advanced quantitative methods. Our research focuses on decision-making and design methods for complex and uncertain environments such as in manufacturing, health systems, transportation and logistics among others. For example, Professor Phebe Vayanos is using advanced optimization and artificial intelligence techniques to help with housing allocation for those experiencing homelessness.

Highlighted areas include: data-driven decision making under uncertainty, health systems improvement, supply chain management, transportation and logistics, large scale optimization, stochastic programming, computer-aided design, 3d printing, risk analysis, information theory, financial engineering, health informatics, and human-computer interaction.

COMPANIES HIRING YOU

Accenture, Amazon, Boeing, Capgemini, Cisco Systems, Ernst & Young, The Disneyland Resort, Honeywell, Kaiser Permanente, KPMG, Microsoft, Northrop Grumman, Oracle, Pandora Media, PepsiCo, PricewaterhouseCoopers, Protiviti, SpaceX, Uber, United Airlines... And many more!

CAREER OPTIONS

- ✔ Implement enterprise resource planning systems
- ✔ Consult on business practices
- ✔ Design efficient manufacturing and service systems
- ✔ Optimize assembly and distribution systems

- ✔ Develop ergonomically correct systems and interfaces
- ✔ Improve hospital operations and schedules
- ✔ Make systems safe by reducing errors and accidents
- ✔ Manage business operations
- ✔ Develop quality control and assurance system

FACULTY HIGHLIGHTS

Dr. Julie Higle earned her Ph.D. in Industrial and Operations Engineering at the University of Michigan, Ann Arbor. Her research interests are in developing stochastic programming models and algorithmic methods for decision making under uncertainty, with a recent focus in the area of stochastic modeling for health-care applications. She has served on the editorial board of Operations Research Letters and as Senior Vice President for Academics for the Institute of Industrial and Systems Engineers, the largest professional society in the field.



Dr. John Carlsson received his Ph.D. from the Institute for Computational and Mathematical Engineering (ICME) at Stanford University. He works on solving problems in continuous location theory, and optimization problems that have some kind of geographic element. His research is supported by DARPA, the Office of Naval Research, the Air Force Office of Scientific Research, and the National Science Foundation. He is the recipient of the 2013 INFORMS Computing Society, the 2014 AFOSR Young Investigator Prize, and the 2016 Popular Science Brilliant ten award. He currently is the instructor of the undergraduate course ISE 330 for junior students, and the advanced graduate course ISE 632 Network Flows and Combinatorial Optimization.



Dr. Yong Chen received his Ph.D. degree in Mechanical Engineering majoring in Computer-aided Engineering from Georgia Tech. Prior to joining USC, he was a Senior Research and Development Engineer at 3D Systems Inc. involved in the development of various direct digital manufacturing (DDM) systems and three-dimensional (3D) printers. He teaches design and manufacturing related courses and serves as an academic advisor to the Undergraduate Fab Lab at USC. His research has been focused on direct digital manufacturing in micro- and meso-scales and the application of computer-aided design and manufacturing (CAD/CAM) in DDM. He has won many awards such as the Outstanding Young Manufacturing Engineer Award from the Society of Manufacturing Engineers (SME), and two Best Paper Awards from the ASME's Computers and Information in Engineering (CIE) division.



Dr. Cesar Acosta holds a Ph.D. in Industrial Engineering from Texas A&M University and a Ph.D. in Statistics from The University of Texas at Dallas. Dr. Acosta is a data analytics and statistical computing scholar. His research interests focus on using advanced statistical analysis to build models for prediction and classification for decision making in applications such as risk management, asset pricing, and credit-risk. He teaches the undergraduate courses on Probability and Statistics, and graduate courses from the MS program in Financial Engineering, and the MS program in Analytics.



Elena Yushan Li | B.S. ISE '17

Upon graduation Elena was primarily interested in data analysis and architecture. After graduation, she joined BlackRock as an analyst within its Aladdin Client Services team. Her day-to-day involves solving critical issues for internal and external clients of Aladdin, an end-to-end investment platform.



Nicholas Munoz | B.S. ISE '17

Minor: Entrepreneurship

At USC, Nicholas was involved as an officer for the USC Chapter of the Institute of Industrial and Systems Engineers, a Mentor for the Center for Engineering Diversity, and a player on the USC Men's Club Lacrosse team. He earned his M.S. in Supply Chain Engineering from Georgia Tech in August, 2018, and now works as a Supply Chain Consultant for OM Partners in Atlanta.



ALUMNI HIGHLIGHTS

Julia Sircar | B.S. ISE '20

Minors: Spanish, Computer and Digital Forensics

Julia was president of her sorority, Tri Delta. She was also a Freshman Academy coach who encouraged new engineers to get involved with their campus community, and inspired some to take leadership roles in Viterbi student organizations. Now, Julia works as a cybersecurity consultant for Deloitte in the Washington, D.C. area.



Juan Perez | B.S. ISE '88, M.S. CME '90

Juan is the Chief Information and Engineering Officer for United Parcel Service (UPS). After completing his BS in ISE and MS in Computer and Manufacturing Engineering, Juan went to work as an engineer for UPS. As a result of learning the company's operations first-hand, via experiences as a van loader and driver, Perez began developing technology projects and quickly moved up through the UPS management ranks. He led the team who developed the company's Orion system that optimizes van routes and reduces delivery times. He also championed the adoption of predictive analytics, resulting in development of UPS's Package Flow and Access Point Network technologies.



Soraya Levy | B.S. ISE '20

Minor: Visual Culture

During her time at USC, Soraya spent part of a semester working and living on an organic saffron and cattle farm in New Zealand. She says the experience combined all of her interests in environmental sustainability, social analysis, and systems thinking. Back on the USC campus, she co-founded a non-profit start-up that collects and redistributes trendy clothes, to promote sustainable practices among fashion consumers. After graduation, Soraya started in a position as a brand planner for General Mills' Natural and Organics Operating Unit in Berkeley, CA.



Industrial & Systems Engineering

FIRST YEAR		SECOND YEAR		THIRD YEAR		FOURTH YEAR	
FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING
ISE 105	ISE 150	ISE 220	ISE 225	ISE 330	CE 315L	ISE 375L	ISE 426
ENGR 102	CHEM 105aL or MASC 110L	MATH 226	ISE 331	ISE 382	ISE 335	ISE 410	ISE 440
MATH 125	MATH 126	PHYS 151L	ISE 460	ISE 435	ISE 370	ISE 495b	ENGR ELECTIVE
WRIT 150	GEN ED	GEN ED	MATH 225	ISE ELECTIVE	ISE 495a	ENGR ELECTIVE	GEN ED
GEN ED	OPTIONAL ELECTIVE	OPTIONAL ELECTIVE	FREE ELECTIVE	WRIT 340	BIOLOGY ELECTIVE	PHYS 152L	GEN ED
			OPTIONAL ELECTIVE		OPTIONAL ELECTIVE		

ENGINEERING

ENGR 102: Engineering Freshman Academy
ISE 105: Intro to Industrial Engineering
ISE 150: Solving Engr. Problems via Computer Programming
ISE 220: Probability Concepts in Engr.
ISE 225: Engineering Statistics I
ISE 315L: Engr. Project Management
ISE 330: Intro. to Operations Research I
ISE 331: Intro. to Operations Research Stochastic Models
ISE 335L: Supply Chain Design
ISE 370: Human Factors in Work Design
ISE 375L: Facilities Design
ISE 382: Database Systems: Concept, Design, and Implementation
ISE 410: Prod. Planning and Scheduling
ISE 426: Statistical Quality Control
ISE 435: Discrete Systems Simulation
ISE 440: Work, Technology and Organization
ISE 460: Engineering Economy
ISE 495a: Senior Design Project
ISE 495b: Senior Design Project
ENGR. & ISE ELECTIVES: Specialized upper division courses you choose for your major/specialization.

MATHEMATICS

MATH 125: Calculus I
MATH 126: Calculus II
MATH 226: Calculus III
MATH 225: Linear Algebra & Differential Equations

SCIENCE

BISC 103L: Biology for the Environment and Life
 or **BISC 104L:** How The Body Works
 or **BISC 230L:** The Biology of the Brain
 or **HBIO 205L:** The Science of Sport
CHEM 105aL: General Chemistry
 or **MASC 110L:** Materials Science
PHYS 151L: Mechanics & Thermodynamics
PHYS 152L: Electricity & Magnetism

GENERAL EDUCATION

As a USC Viterbi student your General Education (Gen Ed) curriculum will include courses in the Arts, Humanistic Inquiry and Social Analysis.

WRITING

WRIT 150: Writing & Critical Reasoning
WRIT 340: Advanced Writing

ELECTIVES

Your optional electives are one way to build engineering+ into your curriculum by choosing classes of interest to you.



Courses with this symbol may be satisfied with certain AP, IB or A-Level exams. With each requirement you replace with prior credit, you increase your optional electives, creating more flexibility for you to pursue additional electives and increase your engineering+ education.

This is a simplified version of a complex curriculum with options and choices made between advisor and student. Course choices can vary by semester and adjust to include relevant topics and materials. Although every attempt has been made to ensure accuracy, the program requirements listed in the USC Catalogue supersede any information which may be contained in this or any other publication of any school or department. The information found in this document is not intended for advising purposes. The University reserves the right to change its policies, rules, regulations, requirements and course offerings at any time.