Concentration requirements:

- A concentration consists of three courses, chosen from the approved lists below. At least one course must be outside IEMS. IEMS cross listed courses (including ENTREP 325, COMP_SCI 396, COMM_ST 352) are considered IEMS courses.
- Students may not earn concentrations alongside majors, minors, or certificates with significant overlap (noted below by concentration).
- Students are encouraged to review prerequisites for all listed courses. IEMS will not advocate for waiving of prerequisites or for permission to enroll in restricted courses.
- Details on how to declare concentrations will be made available soon.

Data Science and Engineering

Students receiving the DSE minor may not receive this concentration.

BMD_ENG 311-0 Computational Genomics
CIV_ENV 377-0 Choice Modeling in Engineering
COMP_SCI 312 Data Privacy
COMP_SCI 326 Introduction to the Data Science Pipeline
COMP_SCI 348-0 Introduction to Artificial Intelligence
COMP_SCI 396-0 Special Topics in Computer Science (Computing, Ethics, and Society)
DATA_ENG 300 Data Engineering Studio
ELEC_ENG 328-0 Information Theory & Learning
ELEC_ENG 335-0 Deep Learning Foundations from Scratch
ELEC_ENG 373-0 Deep Reinforcement Learning
ELEC_ENG 395-0 Special Topics in Electrical Engineering (Optimization Techniques for Machine Learning and Deep Learning)
ES_APPM 375-1 Quantitative Biology I: Experiments, Data, Models, and Analysis
ES_APPM 375-2 Quantitative Biology II: Experiments, Data, Models, and Analysis
IEMS 308-0 Data Science and Analytics
IEMS 340-0 Qualitative Methods in Engineering Systems
IEMS 351-0 Optimization Methods in Data Science
MECH_ENG 301-0 Introduction to Robotics Laboratory
STAT 302 Data Visualization
STAT 357-0 Introduction to Bayesian Statistics
STAT 362-0 Advanced Machine Learning for Data Science

Graduate Preparation

ES_APPM 345 Applied Linear Algebra
IEMS 401 Applied Mathematical Statistics*
IEMS 450-1 Mathematical Optimization I*
MATH 300 Foundations of Higher Mathematics
MATH 306 Combinatorics & Discrete Mathematics
MATH 308 Graph Theory
MATH 320-1, 2, 3 Real Analysis
MATH 330-1, 2, 3 Abstract Algebra
MATH 334 Linear Algebra: Second Course
MATH 370 Mathematical Logic
COMP_SCI 335 Introduction to the Theory of Computation
COMP_SCI 336 Design & Analysis of Algorithms

*Requires permission of instructor
**BSIE CONCENTRATIONS 2023-2024**

**Human-centered Engineering**
*Students receiving the HCI certificate may not receive this concentration.*

- CIV_ENV 308 Environmental Justice
- CIV_ENV 377 Choice Modeling in Engineering
- COMP_SCI 314 Technology and Human Interaction
- COMP_SCI 315 Design, Technology, and Research
- COMP_SCI 329 HCI Studio
- COMP_SCI 330 Human Computer Interaction
- COMP_SCI 347 Conversational AI
- DSGN 300 Designing Your Life
- DSGN 305 Human-Centered Service Design
- DSGN 306 Human-Centered UX Design
- DSGN 308 Human-Centered Product Design
- IEMS 340 Qualitative Methods in Engineering Systems
- IEMS 341 Social Network Analysis
- IEMS 342 Organizational Behavior
- IEMS 344 Whole-Brain Leadership
- IEMS 345 Negotiations and Conflict Resolution for Engineers
- IEMS 385 Introduction to Health Systems Engineering
- LOC 306 Studies in Organizational Change*
- LOC 311 Tools for Organizational Analysis*

*LOC courses are difficult to access but will be accepted as GTE by petition if available.

**Product Management:**
*Courses taken for this concentration must come from at least two different departments/areas. Only one course can be double counted towards any one of the following programs:*

- Segal Design Certificate
- Business Institutions Minor
- Entrepreneurship Minor

- BUS_INST 301 – Accounting
  or ENTREP 330-1 Startup Accounting and Finance
- BUS_INST 302 – Marketing Management
- BUS_INST 303 – Leadership in Organizations
  or IEMS 344 Whole-Brain Leadership
- COMP_SCI 394-0 Agile Software Development
- IMC 303 Integrated Marketing Communications Strategy
- ENTREP/IEMS 325-0 Engineering Entrepreneurship
- ENTREP 331-0 Entrepreneurial Sales and Marketing
- ENTREP 340-0 Innovate for Impact
- DSGN 305 Human-Centered Service Design
- DSGN 306 Human-Centered UX Design
- DSGN 308 Human-Centered Product Design

**Operations, Transportation & Logistics**
*Students receiving the Transportation & Logistics Minor may not receive this concentration.*

- CIV-ENG-371 Transportation Systems Planning and Management
- CIV-ENG-376 Transportation Systems Operations
- CIV_ENV 377 Choice Modelling in Engineering
- DSGN 346 Manufacturing methods for product design
- ECON 355 Transportation Economics and Public Policy
- IEMS 381 Supply Chain Modeling and Analysis
- IEMS 382 Operations Engineering and Management
- IEMS 383 Service Operations Management
- IEMS 385 Introduction to Health Systems Engineering