BSIE CONCENTRATIONS 2023-2024

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.

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*

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

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.*

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

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