

## BSIE CONCENTRATIONS 2024-2025

### Students may earn one or more of five optional three-course concentrations

- Each concentration must include two courses not used towards any other IEMS concentration and must include one course outside IEMS.
- Courses used to fulfill major requirements may be used towards concentrations
- Students may not earn a concentration if receiving a major, minor or certificate in an area with substantial overlap.
- 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.

### 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 2024-2025

### 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