



# IE FOCUS AREA: Big Data Analytics

Department of Industrial and Systems Engineering

## General Education (19 sh) sh

ALL	RHET:1030 Rhetoric	4
F/S	Diversity & Inclusion	3
ALL	Be Creative	3
ALL	Required Gen Ed Course: PSY:1001 Elementary Psychology	3
ALL	Approved Gen Ed Course	3
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## Math & Basic Science Core (24 sh) sh

F/S	MATH:1550 Math I: Single Variable Calculus (P: ALEKS score $\geq$ 75 or MPT Level 3 score $\geq$ 9)	4
ALL	MATH 1560 Math II: Multivariable Calculus (P: MATH:1550)	4
ALL	MATH:2550 Math III: Matrix Algebra (P: MATH:1550)	2
ALL	MATH:2560 Math IV: Differential Equations (P: MATH:1560, MATH:2550)	3
ALL*	STAT:2020 Probability & Statistics For Engr & Phys Sci (P: MATH:1560)	3
ALL	CHEM:1110 Principles of Chemistry I (P: ALEKS score $\geq$ 55 or MPT Level 3 score $\geq$ 9)	4
ALL	PHYS:1611 Introductory Physics I / Lab (C: MATH:1550)	4

## I s sh

F	ENGR:1000 Engineering Success for First-Year Students (First semester standing)	1
F	ENGR:1100 Intro to Engineering Problem Solving	3
F/S	ENGR:1300 Intro to Engineering Computing (C: MATH:1550)	3

## IE Requirements (40 sh) sh

F/S	PHYS:1612 Introductory Physics II / Lab (P: PHYS:1611; C: MATH:1560)	4
S	ISE:2500 Engineering Economy (C: STAT:2020)	3
F	ISE:2360 Design for Manufacturing	3
S	ISE:3300 Manufacturing Systems (P: ENGR:2760, ISE:3700)	3
F	ISE:3350 Process Engineering (P: ISE:3700)	3
F	ISE:3400 Human Factors (P: PSY:1001)	3
S	ISE:3450 Ergonomics	3
S	ISE:3500 Information Systems Design (P: ENGR:1300)	3
F	ISE:3600 Quality Control (P: STAT:2020, or BAIS:9100 or (STAT:3100 & STAT:3101 & STAT:3200))	3
F	ISE:3610 Stochastic Modeling (P: STAT:2020; C: ISE:3700)	3
S	ISE:3660 Data Analytics with R (P: STAT:2020)	3
F/S	ISE:3700 Operations Research (P: MATH:2550; C: STAT:2020)	3
S	ISE:3750 Digital Systems Simulation (P: ISE:3700 & ISE:3610)	3

## IE Capstone Design Courses (4 sh) sh

F/S	ISE:4600 Industrial Engineering Design Project (IEDP) (C: ALL IE Required Courses - ISE:2500, ISE:3300, ISE:3350, ISE:3400, ISE:3450, ISE:3500, ISE:3600, ISE:3660, & ISE:3750)	4
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## IE Departmental Seminars (0 sh) sh

F	ISE:2000 Sophomore Seminar: Industrial Engineering (Status: Sophomore)	0
S	ISE:3000 Professional Seminar: Industrial Engineering (Status: Junior; x2)	0

## Engineering Fundamentals Electives (11 sh) sh

Select at least 11 sh from the list of courses below		
ALL	ENGR:2110 Statics (P: MATH:1550; C: MATH:1560, PHYS:1611)	2
ALL	ENGR:2120 Electrical Circuits (P: MATH:2560)	3
ALL	ENGR:2130 Thermodynamics (P: CHEM:1110, PHYS:1611; C: MATH:1560)	3
ALL*	ENGR:2710 Dynamics (P: ENGR:2110 & MATH:1550)	3
ALL*	ENGR:2720 Materials Science (P: CHEM:1110; C: MATH:1550)	3
ALL*	ENGR:2750 Mechanics of Deformable Bodies (P: ENGR:2110; C: MATH:2560)	3
TBD	BME:2995 Intro to AI & Machine Learning in Engr (P: ENGR:1300; C: MATH:2550)	3

## Required: Big Data Analytics (12sh) sh

F/S	ENGR:2730 Computers in Engineering (P: ENGR:1300)	3
S	STAT:4580 Data Visualization & Data Technologies	3
F	ECE:5450 Pattern Recognition (P: junior standing)	3
OR F	STAT:4540 Statistical Learning (P: junior standing)	3
F	CS:4480 Knowledge & Discovery	3

## Electives: Big Data Analytics (12sh) sh

Elective: Focus Area - Technical Electives		
select two courses from this list		
F	CS:5110 Introduction to Informatics	3
F/S	BAIS:3500 Data Mining (P: (BAIS:2800 or STAT:2020 w/min B or STAT:4101 or ECON:4800) & BAIS:3020 & BAIS:3200)	3
ALL	CS:2210 Discrete Structures (Recommended: Calculus I)	3
ALL	CS:2230 Computer Science II: Data Structures (P: CS:1210 w/min C- or ENGR:2730 w/min C-)	4
F	ECE:3330 Introduction to Software Design (P: ENGR:2730)	3
S	STAT:4740 Large Data Analysis (P: (CS:1210 w/min C- or ENGR:2730 w/min C-) & (MATH:3800 or CS:3700) & (STAT:3200 or IE:3760 or IGPI:3200))	3
TBD	ISE:4172 Big Data Analytics (P: STAT:2020)	3
S	ISE:6380 Deep Learning (Recommended: Knowledge of at least one programming language (Python, C++, MATLAB, etc.))	3

## Elective: Focus Area - Math / Science

select one course from this list		
S	PHYS:2704 Physics IV (P: (PHYS:1612 or PHYS:2703) & (MATH:1860 or MATH:1550))	4
ALL	CHEM:1120 Principles of Chemistry II (P: CHEM:1110 w/min C-)	4
S	STAT:3210 Experimental Design & Analysis (P: STAT:3200)	3
F/S	MATH:3800 Elementary Numerical Analysis (P: (MATH:2250 or MATH:2700) & (MATH:1560 or MATH:1860))	3
F/S	MATH:3550 Engineering Math V (P: MATH:1560 & (MATH:2550 or MATH:2700))	3
ALL	BIOL:1411 Foundations of Biology (P: CHEM:1110)	4

## Elective: Focus Area - Systems

select one course from this list		
F/S	ENGR:2730 Computers in Engineering (P: ENGR:1300)	3
TBD	ISE:4172 Big Data Analytics (P: STAT:2020 or BAIS:9100)	3
F	ISE:4175 Safety Engineering	3
S	ISE:4900 Introduction to Six Sigma (P: ISE:3600)	3
ALL	Any 5000 or above Industrial Engineering (IE) course	3