### Industrial Engineering
#### 2018-2019 Catalog: Suggested Course Sequence

#### Degrees
- **B.S. in IE**
  - 122 credits

#### Semester 1
- **MATH 165**
  - Calc I
  - 4 cr
  - Placement Exam or C- or better in Math 143
- **PHYS 221**
  - Classical Phys I
  - 5 cr
  - Credit/enrollment in MATH 166

#### Semester 2
- **MATH 166**
  - Calc II
  - 4 cr
  - C- or better in MATH 165
  - Placement Exam or C- or better in Math 143
- **I E 248**
  - Intro Mfg Processes
  - 3 cr
  - MATH 166, PHYS 221, Credit/enrollment in IE 101, MAT E 273 Fall Only

#### Semester 3
- **MATH 265**
  - Calc III
  - 4 cr
  - C- or better in MATH 166 or MATH 166H
- **STAT 231**
  - Prob & Stat
  - 4 cr
  - Credit/enrollment in MATH 265 or MATH 265H

#### Semester 4
- **I E 305**
  - Engr Econ Analysis
  - 3 cr
  - MATH 166
- **I E 312**
  - Optimization
  - 3 cr
  - Credit/enrollment in MATH 267 Fall Only

#### Semester 5
- **I E 348**
  - Solidif Processes
  - 3 cr
  - MATH 267
- **I E 361**
  - Quality Assurance
  - 3 cr
  - STAT 231

#### Semester 6
- **I E 413**
  - Stoch Modeling
  - 4 cr
  - Math 267 Stat 231 Fall Only
- **ENGL 314**
  - Tech Comm
  - 3 cr
  - Junior Classification ENGL 250

#### Semester 7
- **I E 441**
  - IE Design
  - 3 cr
  - IE 248, IE 271, IE 361, Credit/Enrollment in IE 341, IE 413, IE 448
- **I E 448**
  - Manuf Sys Engr
  - 3 cr
  - IE 248 IE 305 Spring Only

#### Semester 8
- **IE 148**
  - Information Engr
  - 3 cr
  - Credit/enrollment in MATH 143
- **ENGR 101**
  - Orientation
  - R cr
  - LIB 160 Library 1 cr

#### Total Credits
- 122 credits

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**Note:** Please verify all prerequisites and semester offerings with current course catalog

**Elective List can be found on the IMSE website at** [http://www.imse.iastate.edu/undergraduate-program/advising/](http://www.imse.iastate.edu/undergraduate-program/advising/)

**Course Descriptions can be found at:** [http://catalog.iastate.edu/azcourses/](http://catalog.iastate.edu/azcourses/)

Light blue shading indicates Basic Program classes for all Engineering Majors; Dark blue indicates the IE core, course descriptions on the back of this page

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Industrial Engineering Core Courses

IE 101. Industrial Engineering Profession
Introduce students to the industrial engineering profession, its scope, industrial engineering tools, and future trends.

IE 148. Information Engineering

IE 222. Design & Analysis Methods for System Improvements
Study of system improvement methods and strategies. Specific areas of lean system improvements include continuous improvement, setup reduction, workplace organization, inventory and waste minimization. Methods and strategies to analyze and quantify the impact of changes.

IE 248. Engineering System Design, Manufacturing Processes and Specifications
Introduction to metrology, engineering drawings and specifications. Engineering methods for designing and improving systems. Theory, applications, and quality issues related to machining processes.

IE 271. Applied Ergonomics and Work Design
Basic concepts of ergonomics and work design. Their impact on worker and work place productivity, and cost. Investigations of work physiology, biomechanics, anthropometry, work methods, and their measurement as they relate to the design of human-machine systems.

IE 305. Engineering Economic Analysis
Economic analysis of engineering decisions under uncertainty. Financial engineering basics including time value of money, cash flow estimation, and asset evaluation. Make versus buy decisions. Comparison of project alternatives accounting for taxation, depreciation, inflation, and risk.

IE 312. Optimization
Concepts, optimization and analysis techniques, and applications of operations research. Formulation of mathematical models for systems, concepts, and methods of improving search, linear programming and sensitivity analysis, network models, and integer programming.

IE 341. Production Systems
Introduction of key concepts in the design and analysis of production systems. Topics include inventory control, forecasting, material requirement planning, project planning and scheduling, operations scheduling, and other production systems such as Just-In-Time (JIT), warehousing, and global supply chains.

IE 348. Solidification Processes
Theory and applications related to metal casting, welding, polymer processing, powder metallurgy, composites manufacturing, and related rapid manufacturing processes.

IE 361. Statistical Quality Assurance

IE 413. Stochastic Modeling, Analysis and Simulation
Development and analysis of simulation models using a simulation language. Application to various areas of manufacturing and service systems such as assembly, material handling, and customer queues. Utilizing model output to make important business decisions. Fitting of data to statistical distributions. Introduction to Markov processes and other queuing models.

IE 441. Industrial Engineering Design
A large, open-ended design project related to an enterprise. Application of engineering design principles including problem definition, analysis, synthesis, and evaluation.

IE 448. Manufacturing Systems Engineering
Fixturing and tooling requirements for manufacturing process planning, geometric dimensioning and tolerancing, computer aided inspection, cellular and flexible manufacturing, and facility layout. Lean manufacturing principles and controlled flow production.