Industrial Engineering (IE)

Curriculum Outline

Modern industrial engineering is a combination of basic engineering knowledge and quantitative analysis techniques to support managerial decision making. It is concerned with the efficiency in which work is performed by machines and people. Industrial engineers (IEs) use the information and techniques from physical, biological, mathematical, behavioral, and engineering sciences to plan, control, design, and manage complex manufacturing and business systems. Specifically, they utilize knowledge and principles in manufacturing systems and processes, operations research, ergonomics, and management in specifying, predicting, and evaluating the performance measures of such systems.

The study of industrial engineering places emphasis upon developing the student's abilities to analyze and design systems that integrate technical, economic, and social behavioral factors in manufacturing, service, social, and government organizations. This study leads to a variety of professional opportunities in the manufacturing industry, health care services, research and development, financial centers, public service enterprises, and business corporations.

In order to accomplish these objectives, the Industrial Engineering Program offers a curriculum that is specifically designed, not only to distinguish itself from the curricula offered at other Thai universities, but is also at a standard comparable to those offered at renowned international universities. The IE curriculum offers courses that cover four major industrial engineering areas, namely, ergonomics/safety, operations research/quantitative analysis, management, and manufacturing systems. The offering of courses is carefully arranged so that those providing basic and fundamental courses are taught in the early years to build adequate technical background. Then, their applications are discussed in depth in courses presented in the later years. IE students can choose their preferred area of concentration, either "industrial engineering" or "manufacturing engineering," in their third year. The industrial engineering option is suitable for students who like to pursue a career as an engineering consultant or systems analyst for a business corporation or to continue graduate study either locally or abroad after graduation. For those who like working with industrial equipment and machines and prefer the factory environment to the business office, the manufacturing engineering option will provide them with practical knowledge and experience to help them quickly adapt themselves to their work environment.

In addition, IE students can choose among three optional tracks (Senior Project Track, Foreign Exchange Track, and Extended Training Track).

- **Senior Project Track** is for students who would like to conduct their projects under the supervision of IE faculty members.
- **Foreign Exchange Track** is designed for students who wish to participate in a student exchange program with foreign partner universities.
- **Extended Training Track** is designed for students who would like to participate in a longer training period (for the entire semester) under a co-operative training program with companies.

Structure and Components

1. General Basic Courses	**30**	**Credits**
1.1 Part I	21	Credits
1.1.1 Humanities	2	Credits
1.1.2 Social Sciences	5	Credits
1.1.3 Languages	9	Credits
1.1.4 Science and Mathematics	5	Credits
1.2 Part II	9	Credits
2. Major Courses	**114**	**Credits**
2.1 Basic Courses	51	Credits
2.2 Specialized Courses	63	Credits
3. Free Elective Courses	**6**	**Credits**
Total	**150**	**Credits**

Details of the Curriculum

1. General Basic Courses **30 Credits**

1.1 Part I 21 Credits
- 1.1.1 Humanities (1 course) 2 Credits
  TU110
- 1.1.2 Social Sciences (2 courses) 5 Credits
  TU100 TU120
- 1.1.3 Languages (3 courses) 9 Credits
  EL171 EL172 TU140
- 1.1.4 Science and Mathematics (2 courses) 5 Credits
  ITS100 TU130

1.2 Part II 9 Credits
GTS132 GTS133 GTS202

2. Major Courses **114 Credits**

2.1 Basic Courses 51 Credits
- 2.1.1 Basic Mathematics and Science Courses 24 Credits
  IES201 MAS116 MAS117 MAS210
  SCS126 SCS138 SCS139 SCS176
  SCS183 SCS184
- 2.1.2 Basic Engineering Courses 27 Credits
  CES370 ECS203 ECS204 GTS302 MES231
  MES300 MES302 MES310 MES341 MES371
  MES390

2.2 Specialized Courses 63 Credits
- 2.2.1 Compulsory Engineering Courses 48 Credits
  - 2.2.1.1 Materials and Manufacturing Process 10 Credits
    IES301 IES361 IES362 IES364
  - 2.2.1.2 Work Systems and Safety 7 Credits
    IES312 IES315 IES343
  - 2.2.1.3 Quality Systems 3 Credits
    IES331
  - 2.2.1.4 Economic and Finance 3 Credits
    IES341
  - 2.2.1.5 Production and Operations Management 15 Credits
    IES313 IES321 IES323 IES332
    IES351
  - 2.2.1.6 Integration of Industrial Engineering Techniques 10 Credits
    IES302 IES305 IES353 IES391
- 2.2.2 Elective Engineering Courses 15 Credits

Students can choose among three optional tracks: 6 Credits

1. **For students who wish to join the Senior Project Track** (2 courses)
   IES304 IES401
2. **For students who wish to join the Foreign Exchange Track** (3 courses)
   IES304 IES402 IES403
3. **For students who wish to join the Extended Training Track** (1 course)
   IES404

2.2.2.1 Option I: Industrial Engineering

2.2.2.1.1 IES342 IES392 6 Credits

2.2.2.1.2 IE Technical Elective 3 Credits

Select IE Technical Elective 1 course from the following courses:

IES324 IES334 IES335
IES336 IES345 IES363
IES365 IES371 IES372
IES374 IES376 IES394
IES395 IES396

2.2.2.2 Option II: Manufacturing Engineering

2.2.2.2.1 ECS307 ECS308 6 Credits
IES363

2.2.2.2.2 IE Technical Elective 3 Credits

Select IE Technical Elective 1 course from the following courses:

IES334 IES335 IES336 IES365

3. Free Elective Courses **6 Credits**

Students may choose any free elective courses (not less than 6 credits in total) including general basic courses, except:
1. General basic courses in Science and Mathematics
2. All general basic TU courses in both part 1 and part 2

Total Credit Requirement **150 Credits**

IE Curriculum : 150 Credits

Course		Credits (lecture-practice-self study hours)

First Year

Semester I

EL171	English Course II	3(3-0-6)
GTS132	Introduction to Biological Science	3(3-0-6)
MAS116	Mathematics I	3(3-0-6)
SCS126	Chemistry for Engineers	3(3-0-6)
SCS138	Applied Physics I	3(3-0-6)
SCS176	Chemistry Laboratory	1(0-3-0)
SCS183	Physics Laboratory I	1(0-3-0)
TU100	Civic Education	3(3-0-6)
TU130	Integrated Sciences and Technology	2(2-0-4)
	Sub-Total	**22(20-6-40)**

Semester II

EL172	English Course III	3(3-0-6)
GTS133	Environmental Studies	3(2-2-5)
ITS100	Introduction to Computers and Programming	3(2-3-4)
MAS117	Mathematics II	3(3-0-6)
SCS139	Applied Physics II	3(3-0-6)
SCS184	Physics Laboratory II	1(0-3-0)
TU140	Thai Studies	3(3-0-6)
	Sub-Total	**19(16-8-33)**

Second Year

Semester I

ECS203	Basic Electrical Engineering	3(3-0-6)
IES201	Industrial Engineering Mathematics	3(3-0-6)
IES301	Manufacturing Tools and Operations	3(2-3-4)
MAS210	Mathematics III	3(3-0-6)
MES231	Engineering Mechanics	3(3-0-6)
MES300	Engineering Drawing	3(2-3-4)
MES341	Fluids Dynamics	3(3-0-6)
	Sub-Total	**21(19-6-38)**

Semester II

CES370	Mechanics for Materials	3(3-0-6)
ECS204	Basic Electrical Engineering Laboratory	1(0-3-0)
GTS202	English Language Structures	3(3-0-6)
IES302	Engineering Statistics	3(3-0-6)
IES341	Engineering Economy	3(3-0-6)
MES302	Introduction to Computer Aided Design	2(1-3-2)
MES310	Thermodynamics	3(3-0-6)
MES371	Material Science for Engineers	3(3-0-6)
	Sub-Total	**21(19-6-38)**

Third Year

Semester I

GTS302	Technical Writing	2(2-1-3)
IES312	Methods Analysis and Work Measurement	3(3-0-6)
IES315	Methods Analysis and Work Measurement Laboratory	1(0-3-0)
IES321	Operations Research I	3(3-0-6)
IES331	Quality Control	3(3-0-6)
IES361	Manufacturing Process Design	3(3-0-6)
IES391	Applied Statistical Methods	3(3-0-6)
TU110	Integrated Humanities	2(2-0-4)
	Sub-Total	**20(19-4-37)**

Course		Credits (lecture-practice-self study hours)

Semester II

IES313	Industrial Plant Design	3(3-0-6)
IES323	Production Planning and Control	3(3-0-6)
IES353	Pollution Control and Waste Treatment	3(3-0-6)
IES362	Manufacturing Engineering Lab. I	1(0-3-0)
IES364	Manufacturing Processes Technologies	3(3-0-6)
MES390	Basic Mechanical Engineering Laboratory	1(0-3-0)
	Option I: Industrial Engineering	
IES392	Systems Simulation	3(3-0-6)
IESxxx	IE Technical Elective	3(3-0-6)
	Sub-Total	**20(18-6-36)**
	Option II: Manufacturing Engineering	
ECS308	Basic Electromechanical Energy Conversion	3(3-0-6)
IESxxx	IE Technical Elective	3(3-0-6)
	Sub-Total	**20(18-6-36)**

Summer

Select either Senior Project Track, Foreign Exchange Track, or Extended Training Track.

1. Senior Project Track and Foreign Exchange Track

IES304	Industrial Engineering Training	0(0-0-0)
	Sub-Total	**0(0-0-0)**

2. Extended Training Track

XXXxxx	Free Elective	3(x-x-x)
XXXxxx	Free Elective	3(x-x-x)
	Sub-Total	**6(x-x-x)**

Fourth Year

Semester I

IES305	Senior Project I	1(0-3-0)
IES332	Factory Automation and Control Methods	3(3-0-6)
IES343	Safety Engineering	3(3-0-6)
IES351	Maintenance Engineering	3(3-0-6)
TU120	Integrated Social Sciences	2(2-0-4)
	Option I: Industrial Engineering	
IES342	Industrial Cost Analysis and Control	3(3-0-6)
	Sub-Total	**15(14-3-28)**
	Option II: Manufacturing Engineering	
ECS307	Basic Electromechanical Energy Conversion Laboratory	1(0-3-0)
IES363	Manufacturing Engineering Laboratory II	2(1-3-2)
	Sub-Total	**15(12-9-24)**

Semester II

Select one of the following 3 tracks:

1) Senior Project Track

IES401	Senior Project II	6(0-18-0)
XXXxxx	Free Elective	3(x-x-x)
XXXxxx	Free Elective	3(x-x-x)
	Sub-Total	**12(x-x-x)**

2) Foreign Exchange Track

IES402	Special Study in IE I	3(3-0-6)
IES403	Special Study in IE II	3(3-0-6)
XXXxxx	Free Elective	3(x-x-x)
XXXxxx	Free Elective	3(x-x-x)
	Sub-Total	**12(x-x-x)**

3) Extended Training Track

IES404	Extended Industrial Training	6(0-40-0)
	Sub-Total	**6(0-40-0)**