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 system 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	3	Credits
1.1.2 Social Sciences	3	Credits
1.1.3 Languages	9	Credits
1.1.4 Science and Mathematics	6	Credits
1.2 Part II	9	Credits
2. Core Courses	**114**	**Credits**
2.1 Compulsory Courses	105	Credits
2.2 Compulsory Elective Courses	9	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) 3 Credits
TU 110

1.1.2 Social Sciences (1 course) 3 Credits
TU 120

1.1.3 Languages (3 courses) 9 Credits
EL 171 EL 172 TU 140

1.1.4 Science and Mathematics (2 courses) 6 Credits
ITS 100 TU 130

1.2 Part II 9 Credits
GTS 132 GTS 133 GTS 202

2. Core Courses **114** **Credits**

2.1 Compulsory Courses 105 Credits

2.1.1 Science and Mathematics 24 Credits
IES 201 MAS 116 MAS 117 MAS 210
SCS 126 SCS 138 SCS 139 SCS 176
SCS 183 SCS 184

2.1.2 Non-IE Courses 27 Credits
CES 370 ECS 203 ECS 204 GTS 302
MES 231 MES 300 MES 302 MES 310
MES 341 MES 371 MES 390

2.1.3 IE Common Courses 54 Credits
IES 301 IES 302 IES 305 IES 312
IES 313 IES 315 IES 321 IES 323
IES 331 IES 332 IES 341 IES 343
IES 351 IES 353 IES 361 IES 362
IES 364 IES 391

- **For students who wish to join the Senior Project Track (6 Credits)**
  IES 304 IES 401
- **For students who wish to join the Foreign Exchange Track (6 Credits)**
  IES 304 IES 402 IES 403
- **For students who wish to join the Extended Training Track (6 Credits)**
  IES 404

2.2 Compulsory Elective Courses 9 Credits

2.2.1 Option I: Industrial Engineering

2.2.1.1 IES 342 IES 392 6 Credits

2.2.1.2 IE Technical Elective 3 Credits

Select IE Technical Elective 1 course from the following courses:

IES 307 IES 311 IES 314 IES 322
IES 324 IES 325 IES 333 IES 334
IES 335 IES 336 IES 344 IES 345
IES 346 IES 352 IES 363 IES 365
IES 371 IES 372 IES 373 IES 374
IES 375 IES 376 IES 393 IES 394
IES 395 IES 396

2.2.2 Option II: Manufacturing Engineering

2.2.2.1 ECS 307 ECS 308 IES 363 6 Credits

2.2.2.2 IE Technical Elective 3 Credits

Select IE Technical Elective 1 course from the following courses:

IES 334 IES 335 IES 336 IES 365

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

First Year

Semester I — ***Credits (lecture-practice-self study hrs)***

EL	171	English Course II	3(3-0-6)
GTS	132	Introduction to Biological Science	3(3-1-5)
MAS	116	Mathematics I	3(3-1-5)
SCS	126	Chemistry for Engineers	3(3-1-5)
SCS	138	Applied Physics I	3(3-1-5)
SCS	176	Chemistry Laboratory	1(0-3-0)
SCS	183	Physics Laboratory I	1(0-3-0)
TU	130	Integrated Sciences and Technology	3(3-0-6)
		Sub-Total	**20(18-10-32)**

Semester II

EL	172	English Course III	3(3-0-6)
GTS	133	Environmental Studies	3(2-2-5)
ITS	100	Intro. to Computers and Programming	3(2-3-4)
MAS	117	Mathematics II	3(3-1-5)
SCS	139	Applied Physics II	3(3-1-5)
SCS	184	Physics Laboratory II	1(0-3-0)
TU	140	Thai Study	3(3-0-6)
		Sub-Total	**19(16-10-31)**

Second Year

Semester I — ***Credits (lecture-practice-self study hrs)***

ECS	203	Basic Electrical Engineering	3(3-1-5)
IES	201	Industrial Engineering Mathematics	3(3-0-6)
IES	301	Manufacturing Tools and Operations	3(2-3-4)
MAS	210	Mathematics III	3(3-1-5)
MES	231	Engineering Mechanics	3(3-1-5)
MES	300	Engineering Drawing	3(2-3-4)
MES	341	Fluids Dynamics	3(3-1-5)
		Sub-Total	**21(19-10-34)**

Semester II

CES	370	Mechanics for Materials	3(3-0-6)
ECS	204	Basic Electrical Engineering Laboratory	1(0-3-0)
GTS	202	English Language Structures	3(3-1-5)
IES	302	Engineering Statistics	3(3-1-5)
IES	341	Engineering Economy	3(3-0-6)
MES	302	Introduction to Computer Aided Design	2(1-3-2)
MES	310	Thermodynamics	3(3-1-5)
MES	371	Material Science for Engineers	3(3-1-5)
		Sub-Total	**21(19-10-34)**

Third Year

Semester I — ***Credits (lecture-practice-self study hrs)***

GTS	302	Technical Writing	2(2-1-3)
IES	312	Methods Analysis and Work Measurement	3(3-0-6)
IES	315	Methods Analysis and Work Measurement Laboratory	1(0-3-0)
IES	321	Operations Research I	3(3-1-5)
IES	331	Quality Control	3(3-0-6)
IES	361	Manufacturing Process Design	3(3-0-6)
IES	391	Applied Statistical Methods	3(3-0-6)
TU	110	Integrated Humanities	3(3-0-6)
		Sub-Total	**21(20-5-38)**

Semester II

IES	313	Industrial Plant Design	3(3-0-6)
IES	323	Production Planning and Control	3(3-0-6)
IES	353	Pollution Control and Waste Treatment	3(3-0-6)
IES	362	Manufacturing Engineering Lab. I	1(0-3-0)
IES	364	Manufacturing Processes Technologies	3(3-0-6)
MES	390	Basic Mechanical Engineering Laboratory	1(0-3-0)
		Option I: Industrial Engineering	
IES	392	Systems Simulation	3(3-0-6)
IES	xxx	IE Technical Elective	3(3-0-6)
		Sub-Total	**20(18-6-36)**
		Option II: Manufacturing Engineering	
ECS	308	Basic Electromechanical Energy Conversion	3(3-1-5)
IES	xxx	IE Technical Elective	3(3-0-6)
		Sub-Total	**20(18-7-35)**

Summer

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

For Senior Project Track and Foreign Exchange Track

IES	304	Industrial Engineering Training	0(0-0-0)
		Sub-Total	**0(0-0-0)**

For Extended Training Track

XXX	xxx	Free Elective	3(x-x-x)
XXX	xxx	Free Elective	3(x-x-x)
		Sub-Total	**6(x-x-x)**

Fourth Year

Semester I — ***Credits (lecture-practice-self study hrs)***

IES	305	Senior Project I	1(0-3-0)
IES	332	Factory Automation and Control Methods	3(3-0-6)
IES	343	Safety Engineering	3(3-0-6)
IES	351	Maintenance Engineering	3(3-0-6)
TU	120	Integrated Social Sciences	3(3-0-6)
		Option I: Industrial Engineering	
IES	342	Industrial Cost Analysis and Control	3(3-0-6)
		Sub-Total	**16(15-3-30)**
		Option II: Manufacturing Engineering	
ECS	307	Basic Electromechanical Energy Conversion Laboratory	1(0-3-0)
IES	363	Manufacturing Engineering Laboratory II	2(1-3-2)
		Sub-Total	**16(13-9-26)**

Semester II

Select one of the following 3 tracks:

1) Senior Project Track

IES	401	Senior Project II	6(0-18-0)
XXX	xxx	Free Elective	3(x-x-x)
XXX	xxx	Free Elective	3(x-x-x)
		Sub-Total	**12(x-x-x)**

2) Foreign Exchange Track

IES	402	Special Study in IE I	3(3-0-6)
IES	403	Special Study in IE II	3(3-0-6)
XXX	xxx	Free Elective	3(x-x-x)
XXX	xxx	Free Elective	3(x-x-x)
		Sub-Total	**12(x-x-x)**

3) Extended Training Track

IES	404	Extended Industrial Training	6(0-40-0)
		Sub-Total	**6(0-40-0)**