

## 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 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 also choose 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 an 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 whole semester) under a co-operative training program with companies.

### Structure and Components

<b>1. General Basic Courses</b>	<b>30 Credits</b>
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
<b>2. Core Courses</b>	<b>114 Credits</b>
2.1 Compulsory Courses	105 Credits
2.2 Compulsory Elective Courses	9 Credits
<b>3. Free Elective Courses</b>	<b>6 Credits</b>
<b>Total</b>	<b><u>150</u> Credits</b>

### Details of the Curriculum

<b>1. General Basic Courses</b>	<b>30 Credits</b>
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	
<b>2. Core Courses</b>	<b>114 Credits</b>
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	
• <b>For students who wish to join the Senior Project Track (6 Credits)</b>	
IES 304    IES 401	
• <b>For students who wish to join the Foreign Exchange Track (6 Credits)</b>	
IES 304    IES 402    IES 403	
• <b>For students who wish to join the Extended Training Track (6 Credits)</b>	
IES 404	
2.2 Compulsory Elective Courses	9 Credits
2.2.1 <b>Option I: Industrial Engineering</b>	
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 <b>Option II: Manufacturing Engineering</b>	
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	
<b>3. Free Elective Courses</b>	<b>6 Credits</b>
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	
<b>Total Credit Requirement</b>	<b><u>150</u> Credits</b>

## IE Curriculum: 150 Credits

### First Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
EL 171 English Course II	3(3-1-5)
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)
<b>Sub-Total</b>	<b>20(18-11-31)</b>

### *Semester II*

EL 172 English Course III	3(3-1-5)
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)
<b>Sub-Total</b>	<b>19(16-11-30)</b>

### Third Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
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)
<b>Sub-Total</b>	<b>21(20-5-38)</b>

### *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)
<b>Sub-Total</b>	<b>20(18-6-36)</b>

#### **Option II: Manufacturing Engineering**

ECS 308 Basic Electromechanical Energy Conversion	3(3-1-5)
IES xxx IE Technical Elective	3(3-0-6)
<b>Sub-Total</b>	<b>20(18-7-35)</b>

### **Summer**

IES 304 Industrial Engineering Training	0(0-0-0)
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(except for the students who wish to take the Extended Training Track)

### Second Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
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)
<b>Sub-Total</b>	<b>21(19-10-34)</b>

### *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)
<b>Sub-Total</b>	<b>21(19-10-34)</b>

### Fourth Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
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)
<b>Sub-Total</b>	<b>16(15-3-30)</b>

#### **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)
<b>Sub-Total</b>	<b>16(13-9-26)</b>

### *Semester II*

* XXXxxx Free Elective	3(x-x-x)
* XXXxxx Free Elective	3(x-x-x)

and one of the following 3 tracks:

#### 1) Senior Project Track

IES 401 Senior Project II	6(0-18-0)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

#### 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)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

#### 3) Extended Training Track

IES 404 Extended Industrial Training	6(0-40-0)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

### **Remark**

\*Students who plan to take the **Extended Training Track** in the second semester of their 4<sup>th</sup> year are advised to take 6 credits of these Free Elective Courses in the summer session of the 3<sup>rd</sup> year.