

## 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 results obtained from 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 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, 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 the 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 a graduate study either local 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 (Exchange track, Senior Project Track and Extended Industrial Training Track).

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

### Structure and Components

<b>1. General Basic Courses</b>	<b>51 Credits</b>
1.1 Humanities	6 Credits
1.2 Social Sciences	3 Credits
1.3 English Language	9 Credits
1.4 Science and Mathematics	33 Credits
<b>2. Core Courses</b>	<b>93 Credits</b>
2.1 Compulsory Courses	84 Credits
2.2 Compulsory Elective Courses	9 Credits
<b>3. Free Elective Courses</b>	<b>6 Credits</b>
<b>Total</b>	<b><u>150 Credits</u></b>

### Details of the Curriculum

<b>1. General Basic Courses and Basic Courses in Science and Mathematics</b>	<b>51 Credits</b>
1.1 Humanities (2 courses) TU 110 TU 140	6 Credits
1.2 Social Sciences (1 course) TU 120	3 Credits
1.3 English Language (3 courses) EL 171 EL 172 EL 210	9 Credits
1.4 Science and Mathematics (13 courses) GTS 132 GTS 133 IES 201 MAS 116 MAS 117 MAS 210 SCS 126 SCS 138 SCS 139 SCS 176 SCS 183 SCS 184 TU 130	33 Credits
<b>2. Core Courses</b>	<b>93 Credits</b>
2.1 Compulsory Courses	84 Credits
2.1.1 Non-IE Courses	30 Credits
CES 370 ECS 303 ECS 304 GTS 302 ITS 050 MES 300 MES 302 MES 310 MES 341 MES 351 MES 371 MES 390	
2.1.2 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	
<ul style="list-style-type: none"> <li>• For students who wish to join the Exchange Track (6 Credits) IES 402 IES 403 IES 304</li> <li>• For students who wish to join the Senior Project Track (6 Credits) IES 401 IES 304</li> <li>• For students who wish to join the Extended Industrial Engineering Training Track (6 Credits) IES 404</li> </ul>	
2.2 Compulsory Elective Courses	9 Credits
2.2.1 <b>Option I: Industrial Engineering</b>	6 Credits
2.2.1.1 IES 342 IES 392	
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>	6 Credits
2.2.2.1 EPS 301 EPS 304 IES 363	
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>
Select any courses offered by the university, except basic courses. (XXX xxx)	
<b>Total Credit Requirement</b>	<b><u>150 Credits</u></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)
ITS 050 Intro. to Computers and Programming	3(2-3-4)
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(17-13-30)</b>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
EL 172 English Course III	3(3-1-5)
GTS 132 Introduction to Life Science	3(3-1-5)
GTS 133 Environmental Studies	3(2-2-5)
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(17-9-31)</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>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
IES 313 Industrial Plant Design	3(3-0-6)
IES 323 Production Planning & 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 Technology	3(3-0-6)
MES 390 Basic Mechanical Engineering Laboratory	1(0-3-0)

<i>Option I: Industrial Engineering</i>	<i>Credits (lecture-practice-self study hrs)</i>
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>

<i>Option II: Manufacturing Engineering</i>	<i>Credits (lecture-practice-self study hrs)</i>
EPS 301 Basic Electro-mechanical 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 Industrial Training Track).

### Second Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
ECS 303 Basic Electrical Engineering	3(3-1-5)
IES 201 Industrial Engineering Mathematics	3(3-0-6)
IES 301 Manufacturing Tools and Operation	3(2-3-4)
MAS 210 Mathematics III	3(3-1-5)
MES 300 Engineering Drawing	3(2-3-4)
MES 341 Fluids Dynamics	3(3-1-5)
MES 371 Material Science for Engineering	3(3-1-5)
<b>Sub-Total</b>	<b>21(19-10-34)</b>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
CES 370 Mechanics for Materials	3(3-0-6)
ECS 304 Basic Electrical Engineering Laboratory	1(0-3-0)
EL 210 English for Engineering I	3(3-1-5)
IES 302 Engineering Statistics	3(3-1-5)
IES 341 Engineering Economy	3(3-0-6)
MES 231 Engineering Mechanics	3(3-1-5)
MES 302 Introduction to Computer Aided Design	2(1-3-2)
MES 310 Thermodynamics	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)

<i>Option I: Industrial Engineering</i>	<i>Credits (lecture-practice-self study hrs)</i>
IES 342 Industrial Cost Analysis and Control	3(3-0-6)
<b>Sub-Total</b>	<b>16(15-3-30)</b>

<i>Option II: Manufacturing Engineering</i>	<i>Credits (lecture-practice-self study hrs)</i>
EPS 304 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(15-9-26)</b>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
* XXXxxx Free Elective	3(x-x-x)
* XXXxxx Free Elective	3(x-x-x)

** IES402 Special Studies in IE I	3(3-0-6)
** IES403 Special Studies in IE II	3(3-0-6)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

or	
*** IES401 Senior Project II	6(0-18-0)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

or	
**** IES404 Extended Industrial Training	6(0-40-0)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

### Remarks

\* If students wish to take the **Extended Industrial Training Track** in the second semester of their 4<sup>th</sup> year, the students are advised to take 6 credits of Free Elective courses in the summer semester of the 3<sup>rd</sup> year.

\*\* Special Studies in IE I and II are for the students who wish to take the **Exchange Track**.

\*\*\* Senior Project II is for the students who wish to take the **Senior Project Track**.

\*\*\*\* Extended Industrial Training is for the students who wish to take the **Extended Industrial Training Track**.