

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

| | |
|---------------------------------|---------------------------|
| 1. General Basic Courses | 30 Credits |
| 1.1 Humanities | 6 Credits |
| 1.2 Social Sciences | 3 Credits |
| 1.3 English Language | 9 Credits |
| 1.4 Science and Mathematics | 12 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 | <u>150 Credits</u> |

Details of the Curriculum

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|--|---------------------------|
| 1. General Basic Courses | 30 Credits |
| 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 (4 courses) GTS 132 GTS 133 ITS 050 TU 130 | 12 Credits |
| 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 303 ECS 304 GTS 302 ITS 050 MES 300 MES 302 MES 310 MES 341 MES 351 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: <i>Industrial Engineering</i> | |
| 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: <i>Manufacturing Engineering</i> | |
| 2.2.2.1 EPS 301 EPS 304 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 |
| Select any courses offered by the university, except basic courses. (XXX xxx) | |
| Total Credit Requirement | <u>150 Credits</u> |

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) |
| Sub-Total | 20(17-13-30) |

Semester II

| | |
|---------------------------------------|--------------------|
| EL 172 English Course III | 3(3-1-5) |
| GTS 133 Environmental Studies | 3(2-2-5) |
| GTS 132 Introduction to Life Sciences | 3(3-1-5) |
| 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) |
| Sub-Total | 19(17-9-31) |

Third Year

Semester I

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|--|--------------------|
| 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 362 Manufacturing Engineering Lab. I | 1(0-3-0) |
| MES 390 Basic Mechanical Engineering Laboratory | 1(0-3-0) |
| IES 364 Manufacturing Processes Technologies | 3(3-0-6) |
| IES 353 Pollution Control and Waste Treatment | 3(3-0-6) |

Option I: Industrial Engineering

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|-------------------------------|--------------------|
| 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

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|--|--------------------|
| EPS 301 Basic Electro-mechanical Energy Conversion | 3(3-1-5) |
| IES xxx IE Technical Elective | 3(3-0-6) |
| Sub-Total | 20(18-7-35) |

Summer

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|---|----------|
| IES 304 Industrial Engineering Training | 0(0-0-0) |
|---|----------|

(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> |
|--|--|
| 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 300 Engineering Drawing | 3(2-3-4) |
| MES 341 Fluids Dynamics | 3(3-1-5) |
| MES 371 Material Science for Engineers | 3(3-1-5) |
| ECS 303 Basic Electrical Engineering | 3(3-1-5) |
| Sub-Total | 21(19-10-34) |

Semester II

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|---|---------------------|
| CES 370 Mechanics for Materials | 3(3-0-6) |
| 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) |
| ECS 304 Basic Electrical Engineering Laboratory | 1(0-3-0) |
| Sub-Total | 21(19-10-34) |

Fourth Year

Semester I

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|--|----------|
| 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

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|--|--------------------|
| IES 342 Industrial Cost Analysis and Control | 3(3-0-6) |
| Sub-Total | 16(15-3-30) |

Option II: Manufacturing Engineering

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| IES 363 Manufacturing Engineering Laboratory II | 2(1-3-2) |
| EPS 304 Basic Electromechanical Energy Conversion Laboratory | 1(0-3-0) |
| Sub-Total | 16(13-9-26) |

Semester II

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|------------------------|----------|
| * 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

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|---------------------------|------------------|
| IES 401 Senior Project II | 6(0-18-0) |
| Sub-Total | 12(x-x-x) |

2) Foreign Exchange Track

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| IES 402 Special Studies in IE I | 3(3-0-6) |
| IES 403 Special Studies in IE II | 3(3-0-6) |
| Sub-Total | 12(x-x-x) |

3) Extended Training Track

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|--------------------------------------|------------------|
| IES 404 Extended Industrial Training | 6(0-40-0) |
| Sub-Total | 12(x-x-x) |

Remark

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