

# Chemical Engineering (ChE)

## Curriculum Outline

Chemical engineering is a branch of engineering that deals with the chemical and physical processes used to develop and make products such as pharmaceuticals, artificial organs, semiconductors, oil refineries, solar panels, clean water, and biocompatible polymers. Chemical engineers have made major contributions to the modern society. With the additional knowledge of biology, chemical engineers are devising new ways for living organisms to perform molecular transformation, and discovering new schemes for delivery of medicines to specific sites in the body.

Chemical engineering program intends to prepare chemical engineers for life-long achievement through education in the principles of chemical engineering; to encourage development of communication, teamwork and leadership skills.

The basic foundation in mathematics, chemistry, physics, and engineering is established in the first two years of the curriculum. A core of required chemical engineering courses is followed by a selection of electives. One group of electives will prepare students to be biochemical engineers, and another group to be chemical process and material engineers.

In addition, ChE 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 ChE faculty members.
- **Foreign Exchange Track** is designed for students who would like 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 or organizations.

## 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>112 Credits</b>
2.1 Compulsory Courses	99 Credits
2.2 Compulsory Elective Courses	10 Credits
2.3 Technical Elective Courses	3 Credits
<b>3. Free Elective Courses</b>	<b>6 Credits</b>
<b>Total</b>	<b><u>148</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) TU 110	3 Credits
1.1.2 Social Sciences (1 course) TU 120	3 Credits
1.1.3 Languages (3 courses) EL 171    EL 172    TU 140	9 Credits
1.1.4 Science and Mathematics (2 courses) ITS 100    TU 130	6 Credits
1.2 Part II	9 Credits
GTS 132    GTS 133    GTS 202	
<b>2. Core Courses</b>	<b>112 Credits</b>
2.1 Compulsory Courses	99 Credits
2.1.1 Science and Mathematics (9 Courses)	21 Credits
MAS 116    MAS 117    MAS 210    SCS 126	
SCS 138    SCS 139    SCS 176    SCS 183	
SCS 184	
2.1.2 Non-ChE Courses (7 courses)	18 Credits
ECS 203    ECS 204    GTS 302    IES 341	
MES 231    MES 300    MES 371	
2.1.3 ChE Courses (21-23 courses)	60 Credits
Part I	54 Credits
CHS 211    CHS 212    CHS 213    CHS 241	
CHS 242    CHS 251    CHS 316    CHS 331	
CHS 343    CHS 352    CHS 353    CHS 359	
CHS 362    CHS 363    CHS 402    CHS 415	
CHS 417    CHS 455    CHS 457    CHS 461	
Part II	6 Credits
(CHS 301 and CHS 484) or (CHS 301, CHS 485 and CHS 486) or (CHS 487)	
2.2 Compulsory Elective Courses	10 Credits
2.2.1 <b>Option I: Bio-Chemical Engineering</b> (4 courses)	
CHS 321    CHS 327    CHS 328    CHS 429	
2.2.2 <b>Option II: Chemical Process and Materials</b> (4 courses)	
CHS 358    CHS 371    CHS 372    CHS 373	
2.3 Technical Elective Course (1 course)	3 Credits
Student must select to study 1 subject (3 credits) from one of the following options :	
2.3.1 <b>Biomedical Engineering</b> CHS 328    CHS 424    CHS 462	
2.3.2 <b>Food Engineering</b> CHS 425	
2.3.3 <b>Biotechnology</b> CHS 327    CHS 414    CHS 426	
2.3.4 <b>Chemical Process and Materials</b> CHS 371    CHS 372    CHS 373    CHS 463	
CHS 474	
2.3.5 <b>General Chemical Engineering</b> CHS 481    CHS 482    CHS 483	
<b>3. Free Elective Courses</b>	<b>6 Credits</b>
Students may choose any free elective courses (not less than 6 credits in total) offered by SIIT or TU including general basic courses, except:	
1. General basic courses in Science and Mathematics.	
2. General basic TU courses.	
XXX xxx Free Elective Course	3 Credits
XXX xxx Free Elective Course	3 Credits
<b>Total Credit Requirement</b>	<b><u>148</u> Credits</b>

## ChE Curriculum : 148 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>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
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 Studies	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>
CHS 331 Chemical Reaction Kinetics and Reactor Design	3(3-0-6)
CHS 343 Chemical Engineering Thermodynamics II	3(3-0-6)
CHS 352 Unit Operations II	3(3-0-6)
CHS 359 Computer Applications for Chemical Engineering	3(2-3-4)
CHS 362 Chemical Engineering Laboratory I	1(0-3-0)
<b>Option I: Bio-Chemical Engineering</b>	
CHS 321 Cell Biology for Chemical Engineers	3(3-0-6)
CHS 327 Bio-Chemical Technology	3(3-0-6)
<b>Sub-Total</b>	<b>19(17-6-34)</b>
<b>Option II: Chemical Process and Materials</b>	
CHS 371 Petroleum and Petrochemical Technology	3(3-0-6)
CHS 372 Polymer Science and Development	3(3-0-6)
<b>Sub-Total</b>	<b>19(17-6-34)</b>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
CHS 353 Unit Operations III	3(3-0-6)
CHS 363 Chemical Engineering Laboratory II	1(0-3-0)
CHS 417 Safety in Chemical Operations	3(3-0-6)
CHS 455 Chemical Engineering Process Design	3(3-0-6)
IES 341 Engineering Economy	3(3-0-6)
TU 120 Integrated Social Sciences	3(3-0-6)
<b>Option I: Bio-Chemical Engineering</b>	
CHS 328 Pharmaceutical Industry and Technology	3(3-0-6)
<b>Sub-Total</b>	<b>19(18-3-36)</b>
<b>Option II: Chemical Process and Materials</b>	
CHS 373 Polymer Processing	3(3-0-6)
<b>Sub-Total</b>	<b>19(18-3-36)</b>

<i>Summer</i>	<i>Credits (lecture-practice-self study hrs)</i>
CHS 301 Chemical Engineering Training	0(0-0-0)
(Except for students who select to take CHS 487 in the second semester of their fourth year)	

### Second Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
CHS 211 Organic Chemistry for Engineers	3(3-0-6)
CHS 241 Material and Energy Balance	3(3-0-6)
CHS 316 Statistics for Chemical Engineering	3(3-0-6)
ECS 203 Basic Electrical Engineering	3(3-1-5)
GTS 202 English Language Structures	3(3-1-5)
MAS 210 Mathematics III	3(3-1-5)
MES 300 Engineering Drawing	3(2-3-4)
<b>Sub-Total</b>	<b>21(20-6-37)</b>

<i>Semester II</i>	<i>Credits (lecture-practice-self study hrs)</i>
CHS 212 Physical Chemistry for Engineers	3(3-0-6)
CHS 213 Applied Mathematics in Chemical Engineering	3(3-0-6)
CHS 242 Chemical Engineering Thermodynamics I	3(3-0-6)
CHS 251 Unit Operations I	3(3-0-6)
ECS 204 Basic Electrical Engineering Laboratory	1(0-3-0)
GTS 302 Technical Writing	2(2-1-3)
MES 231 Engineering Mechanics	3(3-1-5)
MES 371 Material Science for Engineers	3(3-1-5)
<b>Sub-Total</b>	<b>21(20-6-37)</b>

### Fourth Year

<i>Semester I</i>	<i>Credits (lecture-practice-self study hrs)</i>
CHS 402 Chemical Engineering Seminar	1(0-2-1)
CHS 415 Environmental Chemical Engineering	3(3-0-6)
CHS 457 Chemical Engineering Plant Design	3(3-0-6)
CHS 461 Process Dynamics and Control	3(3-0-6)
CHS xxx CHS Technical Elective	3(3-0-6)
TU 110 Integrated Humanities	3(3-0-6)
<b>Option I: Bio-Chemical Engineering</b>	
CHS 429 Bio-Chemical Technology Laboratory	1(0-3-0)
<b>Sub-Total</b>	<b>17(15-5-31)</b>
<b>Option II: Chemical Process and Materials</b>	
CHS 358 Chemical Process Laboratory	1(0-3-0)
<b>Sub-Total</b>	<b>17(15-5-31)</b>

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

and one of the following 3 tracks:

<b>1) Senior Project Track</b>	
CHS 484 Senior Project	6(0-18-0)
<b>Sub-Total</b>	<b>12(x-x-x)</b>
<b>2) Foreign Exchange Track</b>	
CHS 485 Special Study in ChE I	3(3-0-6)
CHS 486 Special Study in ChE II	3(3-0-6)
<b>Sub-Total</b>	<b>12(x-x-x)</b>
<b>3) Extended Training Track</b>	
CHS 487 Chemical Engineering Extended Training	6(0-40-0)
<b>Sub-Total</b>	<b>12(x-x-x)</b>

#### **Remark**

\*Students who plan to take the Extended Chemical Engineering Training are advised to take the two free elective courses in the summer session of the 3<sup>rd</sup> year.