

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

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	112 Credits
2.1 Compulsory Courses	99 Credits
2.2 Compulsory Elective Courses	10 Credits
2.3 Technical Elective Courses	3 Credits
3. Free Elective Courses	6 Credits
Total	<u>148</u> Credits

Details of the Curriculum

1. General Basic Courses	30 Credits
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	
2. Core Courses	112 Credits
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 Option I: Bio-Chemical Engineering (4 courses)	
CHS 321 CHS 327 CHS 328 CHS 429	
2.2.2 Option II: Chemical Process and Materials (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 Biomedical Engineering CHS 328 CHS 424 CHS 462	
2.3.2 Food Engineering CHS 425	
2.3.3 Biotechnology CHS 327 CHS 414 CHS 426	
2.3.4 Chemical Process and Materials CHS 371 CHS 372 CHS 373 CHS 463	
CHS 474	
2.3.5 General Chemical Engineering CHS 481 CHS 482 CHS 483	
3. Free Elective Courses	6 Credits
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
Total Credit Requirement	<u>148</u> Credits

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)
Sub-Total	20(18-11-31)

<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)
Sub-Total	19(16-11-30)

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)
Option I: Bio-Chemical Engineering	
CHS 321 Cell Biology for Chemical Engineers	3(3-0-6)
CHS 327 Bio-Chemical Technology	3(3-0-6)
Sub-Total	19(17-6-34)
Option II: Chemical Process and Materials	
CHS 371 Petroleum and Petrochemical Technology	3(3-0-6)
CHS 372 Polymer Science and Development	3(3-0-6)
Sub-Total	19(17-6-34)

<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)
Option I: Bio-Chemical Engineering	
CHS 328 Pharmaceutical Industry and Technology	3(3-0-6)
Sub-Total	19(18-3-36)
Option II: Chemical Process and Materials	
CHS 373 Polymer Processing	3(3-0-6)
Sub-Total	19(18-3-36)

<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)
Sub-Total	21(20-6-37)

<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)
Sub-Total	21(20-6-37)

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)
Option I: Bio-Chemical Engineering	
CHS 429 Bio-Chemical Technology Laboratory	1(0-3-0)
Sub-Total	17(15-5-31)
Option II: Chemical Process and Materials	
CHS 358 Chemical Process Laboratory	1(0-3-0)
Sub-Total	17(15-5-31)

<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:

1) Senior Project Track	
CHS 484 Senior Project	6(0-18-0)
Sub-Total	12(x-x-x)

2) Foreign Exchange Track	
CHS 485 Special Study in ChE I	3(3-0-6)
CHS 486 Special Study in ChE II	3(3-0-6)
Sub-Total	12(x-x-x)

3) Extended Training Track	
CHS 487 Chemical Engineering Extended Training	6(0-40-0)
Sub-Total	12(x-x-x)

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 3rd year.