Chemical Engineering (ChE)

Curriculum Outline

Chemical engineering (ChE) 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 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.

The 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 choose one among 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 a student 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 entire 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	**148**	**Credits**

Details of the Curriculum

1. General Basic Courses 30 Credits

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

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 **148** **Credits**

ChE Curriculum : 148 Credits

First Year

Semester I — ***Credits (lecture-practice-self study hrs)***

EL	171	English Course II	3(3-0-6)
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(18-10-32)**

Semester II

EL	172	English Course III	3(3-0-6)
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(16-10-31)**

Second Year

Semester I — ***Credits (lecture-practice-self study hrs)***

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)**

Semester II

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)**

Third Year

Semester I — ***Credits (lecture-practice-self study hrs)***

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)**

Semester II

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)**

Summer

Select either Senior Project Track, Foreign Exchange Track, or Extended Training Track.

1. Senior Project Track and Foreign Exchange Track

CHS	301	Chemical Engineering Training	0(0-0-0)
		Sub-Total	**0(0-0-0)**

2. Extended Training Track

XXX	xxx	Free Elective	3(x-x-x)
XXX	xxx	Free Elective	3(x-x-x)
		Sub-Total	**6(x-x-x)**

Fourth Year

Semester I — ***Credits (lecture-practice-self study hrs)***

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)**

Semester II

1) Senior Project Track

CHS	484	Senior Project	6(0-18-0)
XXX	xxx	Free Elective	3(x-x-x)
XXX	xxx	Free Elective	3(x-x-x)
		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)
XXX	xxx	Free Elective	3(x-x-x)
XXX	xxx	Free Elective	3(x-x-x)
		Sub-Total	**12(x-x-x)**

3) Extended Training Track

CHS	487	Chemical Engineering Extended Training	6(0-40-0)
		Sub-Total	**6(0-40-0)**