

## 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 special study (Senior Project, Foreign Exchange, and Extended Training).

- **Senior Project** is for students who would like to conduct their projects under the supervision of ChE faculty members.
- **Foreign Exchange** is designed for students who would like to participate in a student exchange program with foreign partner universities.
- **Extended Training** 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

|   |                    |
|---|--------------------|
| <b>1) General Basic Courses</b>             | <b>30 Credits</b>  |
| 1.1 Part I                                  | 21 Credits         |
| 1.1.1 Humanities                            | 2 Credits          |
| 1.1.2 Social Sciences                       | 5 Credits          |
| 1.1.3 Languages                             | 9 Credits          |
| 1.1.4 Science and Mathematics               | 5 Credits          |
| 1.2 Part II                                 | 9 Credits          |
| <b>2) Major Courses</b>                     | <b>111 Credits</b> |
| 2.1) Basic Courses                          | 37 Credits         |
| 2.1.1 Basic Mathematics and Science Courses | 21 Credits         |
| 2.1.2 Basic Engineering Courses             | 16 Credits         |
| 2.2) Specialized Courses                    | 74 Credits         |
| 2.2.1 Compulsory Engineering Courses        | 59 Credits         |
| 2.2.2 Elective Engineering Courses          | 15 Credits         |
| <b>3) Free Elective Courses</b>             | <b>6 Credits</b>   |
| <b>Total</b>                                | <b>147 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)<br>TU110  | 2 Credits          |
| 1.1.2 Social Sciences (2 courses)<br>TU100 TU120  | 5 Credits          |
| 1.1.3 Languages (3 courses)<br>EL171 EL172 TU140  | 9 Credits          |
| 1.1.4 Science and Mathematics (2 courses)<br>ITS100 TU130   | 5 Credits          |
| 1.2 Part II   | 9 Credits          |
| GTS132 GTS133 GTS202  |                    |
| <b>2. Major Courses</b>   | <b>111 Credits</b> |
| 2.1 Basic Courses   | 37 Credits         |
| 2.1.1 Basic Mathematics and Science Courses (9 courses)<br>MAS116 MAS117 MAS210 SCS126<br>SCS138 SCS139 SCS176 SCS183<br>SCS184                 | 21 Credits         |
| 2.1.2 Basic Engineering Courses (7 courses)<br>ECS203 ECS204 GTS302 MES231<br>MES300 MES371 CHS402  | 16 Credits         |
| 2.2 Specialized Courses   | 74 Credits         |
| 2.2.1 Compulsory Engineering Courses  | 59 Credits         |
| 2.2.1.1 Principles of Chemical Engineering (8 courses)<br>CHS211 CHS212 CHS213 CHS241<br>CHS242 CHS316 CHS343 CHS364                            | 24 Credits         |
| 2.2.1.2 Applied Chemical Engineering (9 courses)<br>CHS251 CHS331 CHS352 CHS353<br>CHS355 CHS362 CHS363 CHS461<br>CHS456                        | 23 Credits         |
| 2.2.1.3 Plant Design and Management (4 courses)<br>CHS315 CHS317 CHS457 IES341  | 12 Credits         |
| 2.2.2 Elective Engineering Courses  | 15 Credits         |
| 2.2.2.1 Special Study   | 6 Credits          |
| Students can choose one among three special study   |                    |
| • <b>Senior Project</b> (2 courses)<br>CHS301 CHS484  | 6 Credits          |
| • <b>Foreign Exchange</b> (3 courses)<br>CHS301 CHS485 CHS486   | 6 Credits          |
| • <b>Extended Training</b> (1 course)<br>CHS487   | 6 Credits          |
| 2.2.2.2 Optional Courses (2 courses)<br>Students choose two out of four optional courses<br>CHS327 CHS328 CHS374 CHS375                         | 6 Credits          |
| 2.2.2.3 Technical Elective Courses (1 course)<br>Student must select to study 1 subject (3 credits)<br>from CHSxxx                              | 3 Credits          |
| <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.<br>XXXxxx, XXXxxx  |                    |

**Total Credit Requirement** **147 Credits**

## ChE Curriculum : 147 Credits

| <i>Course</i>                                     | <i>Credits (lecture-practice-self study hours)</i>       | <i>Course</i> | <i>Credits (lecture-practice-self study hours)</i> |
|---|--|---------------|--|
| <b>First Year</b>                                 |  |               |  |
| <b>Semester I</b>                                 |  |               |  |
| EL171   | English Course II  |               | 3(3-0-6)   |
| GTS132  | Introduction to Biological Science                       |               | 3(3-0-6)   |
| MAS116  | Mathematics I  |               | 3(3-0-6)   |
| SCS126  | Chemistry for Engineers                                  |               | 3(3-0-6)   |
| SCS138  | Applied Physics I  |               | 3(3-0-6)   |
| SCS176  | Chemistry Laboratory                                     |               | 1(0-3-0)   |
| SCS183  | Physics Laboratory I                                     |               | 1(0-3-0)   |
| TU130   | Integrated Sciences and Technology                       |               | 2(2-0-4)   |
| TU100   | Civic Education  |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>22(20-6-40)</b>                                 |
| <b>Semester II</b>                                |  |               |  |
| EL172   | English Course III                                       |               | 3(3-0-6)   |
| GTS133  | Environmental Studies                                    |               | 3(2-2-5)   |
| ITS100  | Introduction to Computer and Programming                 |               | 3(2-3-4)   |
| MAS117  | Mathematics II   |               | 3(3-0-6)   |
| SCS139  | Applied Physics II                                       |               | 3(3-0-6)   |
| SCS184  | Physics Laboratory II                                    |               | 1(0-3-0)   |
| TU140   | Thai Studies   |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>19(16-8-33)</b>                                 |
| <b>Second Year</b>                                |  |               |  |
| <b>Semester I</b>                                 |  |               |  |
| CHS211  | Organic Chemistry  |               | 3(3-0-6)   |
| CHS241  | Material and Energy Balance                              |               | 3(3-0-6)   |
| CHS316  | Statistics for Chemical Engineering                      |               | 3(3-0-6)   |
| ECS203  | Basic Electrical Engineering                             |               | 3(3-0-6)   |
| GTS202  | English Language Structures                              |               | 3(3-0-6)   |
| MAS210  | Mathematics III  |               | 3(3-0-6)   |
| MES300  | Engineering Drawing                                      |               | 3(2-3-4)   |
|   | <b>Sub-Total</b>   |               | <b>21(20-3-40)</b>                                 |
| <b>Semester II</b>                                |  |               |  |
| CHS212  | Physical Chemistry                                       |               | 3(3-0-6)   |
| CHS213  | Applied Mathematics in Chemical Engineering              |               | 3(3-0-6)   |
| CHS242  | Thermodynamics I   |               | 3(3-0-6)   |
| CHS251  | Fluid Dynamics   |               | 3(3-0-6)   |
| ECS204  | Basic Electrical Engineering Laboratory                  |               | 1(0-3-0)   |
| GTS302  | Technical Writing  |               | 2(2-1-3)   |
| MES231  | Engineering Mechanics                                    |               | 3(3-0-6)   |
| MES371  | Material Science for Engineers                           |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>21(20-4-39)</b>                                 |
| <b>Third Year</b>                                 |  |               |  |
| <b>Semester I</b>                                 |  |               |  |
| CHS315  | Environmental Chemical Engineering                       |               | 3(3-0-6)   |
| CHS331  | Chemical Reaction Kinetics and Reactor Design            |               | 3(3-0-6)   |
| CHS343  | Thermodynamics II  |               | 3(3-0-6)   |
| CHS352  | Heat Transfer  |               | 3(3-0-6)   |
| CHS362  | Chemical Engineering Laboratory I                        |               | 1(0-3-0)   |
| TU120   | Integrated Social Sciences                               |               | 2(2-0-4)   |
| CHS32x  | Optional Course  |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>18(17-3-34)</b>                                 |
| <b>or</b>   |  |               |  |
| CHS37x  | Optional Course  |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>18(17-3-34)</b>                                 |
| <b>Semester II</b>                                |  |               |  |
| CHS317  | Safety in Chemical Operations                            |               | 3(3-0-6)   |
| CHS353  | Mass Transfer  |               | 3(3-0-6)   |
| CHS363  | Chemical Engineering Laboratory II                       |               | 1(0-3-0)   |
| CHS355  | Chemical Engineering Process Design                      |               | 3(3-0-6)   |
| CHS364  | Experimental Design and Methods for Chemical Engineering |               | 3(3-0-6)   |
| CHS32x  | Optional Course  |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>19(18-3-36)</b>                                 |
| <b>or</b>   |  |               |  |
| CHS37x  | Optional Course  |               | 3(3-0-6)   |
|   | <b>Sub-Total</b>   |               | <b>19(18-3-36)</b>                                 |
| <b>Summer</b>                                     |  |               |  |
| Students can choose one among three special study |  |               |  |
| <b>1) Senior Project and Foreign Exchange</b>     |  |               |  |
| CHS301  | Chemical Engineering Training                            |               | 0(0-0-0)   |
|   | <b>Sub-Total</b>   |               | <b>0(0-0-0)</b>                                    |
| <b>2) Extended Training</b>                       |  |               |  |
| XXXxxx  | Free Elective  |               | 3(x-x-x)   |
| XXXxxx  | Free Elective  |               | 3(x-x-x)   |
|   | <b>Sub-Total</b>   |               | <b>6(x-x-x)</b>                                    |
| <b>Fourth Year</b>                                |  |               |  |
| <b>Semester I</b>                                 |  |               |  |
| CHS402  | Seminar  |               | 1(0-2-1)   |
| CHS456  | Transport Phenomena                                      |               | 3(3-0-6)   |
| CHS457  | Chemical Engineering Plant Design                        |               | 3(3-0-6)   |
| CHS461  | Process Dynamics and Control                             |               | 3(3-0-6)   |
| CHSxxx  | CHS Technical Elective                                   |               | 3(3-0-6)   |
| TU110   | Integrated Humanities                                    |               | 2(2-0-4)   |
|   | <b>Sub-Total</b>   |               | <b>15(14-2-29)</b>                                 |
| <b>Semester II</b>                                |  |               |  |
| <b>1) Senior Project</b>                          |  |               |  |
| CHS484  | Chemical Engineering Project                             |               | 6(0-18-0)  |
| XXXxxx  | Free Elective  |               | 3(x-x-x)   |
| XXXxxx  | Free Elective  |               | 3(x-x-x)   |
|   | <b>Sub-Total</b>   |               | <b>12(x-x-x)</b>                                   |
| <b>2) Foreign Exchange</b>                        |  |               |  |
| CHS485  | Special Studies in ChE I                                 |               | 3(3-0-6)   |
| CHS486  | Special Studies in ChE II                                |               | 3(3-0-6)   |
| XXXxxx  | Free Elective  |               | 3(x-x-x)   |
| XXXxxx  | Free Elective  |               | 3(x-x-x)   |
|   | <b>Sub-Total</b>   |               | <b>12(x-x-x)</b>                                   |
| <b>3) Extended Training</b>                       |  |               |  |
| CHS487  | Extended Chemical Engineering Training                   |               | 6(0-40-0)  |
|   | <b>Sub-Total</b>   |               | <b>6(0-40-0)</b>                                   |