Training Program for Undergraduates

（2014 version）

Training Program for Undergraduates majoring in Chemical Engineering

1. Training Objectives

To cultivate high-level and high-quality technological and managerial talent with a solid foundation of knowledge, plus strong practical ability and creative thinking in basic chemical engineering and related fields. Graduates will be qualified in research & development or a technical management job relating to new technology, new production and processes, and new products in chemical engineering or a related field.

2. Basic Requirements

Graduates of chemical engineering programs will obtain the following knowledge, abilities and qualities:

to master a solid theory of basic natural science, humanities and social science, engineering technology;

to qualify with professional advanced specialized knowledge;

to obtain strong practical ability in modern chemical engineering;

to have a strong awareness of, and the ability to, innovate;

to have a strong social sense of responsibility, good engineering ethics and a strong sense of professional conduct;

to have a strong thirst for knowledge and the ability to pursue lifelong learning;

to achieve a deep basis and wide-ranging foundations in general education.

3. Educational System and Degree Awarded

Educational system: this program provides a four-year degree program, according to the credit management system to be achieved with flexible duration.

Degree awarded: Bachelor of Engineering.

4. Basic Credits and Class Hours

Total credits for undergraduate training are 174, of which credits in the spring and fall semesters are 144, credits for internship and practical training in the summer semester are 15, and credits for the diploma project (thesis) are 15.

5. Core Courses (10 courses; 30 credits in total)

Principles of Chemical Engineering A(1) (4 credits)
Principles of Chemical Engineering A(2) (3 credits)
Principle of Transport Processes (3 credits)
Chemical Reaction Engineering (4 credits)
Thermodynamics of Chemical Engineering (3 credits)
Chemical Processes and Equipment Design (4 credits)
Chemical Engineering Experiment (1) (2 credits)
Lab. of Chemical Engineering (2) (2 credits)

Fundamentals of Chemical Systems Engineering (3 credits)
Fundamentals of Biochemical Engineering (2 credits).

6. Curriculum and Credits

1) Courses in General Fundamentals 26 credits

a) Ideological and Political Theory - 14 credits

10610183	Ideological, Moral and Legal Education	3 credits
10610193	Essentials of Modern History of China	3 credits
10610204	Principles of Marxist Philosophy	4 credits
10610224	Mao Zedong Thought/Socialism with Chinese Characteristics	4 credits

b) Physical Education - 4 credits

Physical Education is a required course which from the first to the fourth semester (1 credit for each semester); in the fifth to eighth semester physical education does not have credits; it is a selected elective course from the fifth to the sixth semester, whereas it is an elective course from the seventh to the eighth semester.

c) Foreign Language - 8 credits

English courses comprise 8 credits in total, of which at least 4 credits are from required courses in English; these should be completed in the first four semesters. A compulsory part for students who major in non-English subjects is to attend English Practice (2 credits) in the summer semester; this can be completed in any one of the summer semesters, from the first year to the junior year, and those who meet the relevant requirements can apply for exemption (detailed arrangements about “English Practice” for undergraduates will be described below). The Tsinghua English Proficiency Test is aimed at testing the English level of students who major in non-English subjects, and can be taken after one year’s study.

Students who major in Japanese, German, French, Russian and other minority languages can begin the course directly after entering school, and at least three semesters’ courses should be completed before graduating and obtaining 6 credits.

2. Cultural Quality Courses 13 credits

The cultural quality education curriculum includes cultural quality education core courses, the freshman seminar, cultural quality education lecture courses and general cultural quality education.

Other than the cultural quality education seminars and the freshman seminar, all other courses are divided into eight sections: (1) Philosophy and Ethics, (2) History and Culture, (3) Language and Literature, (4) Art and Aesthetics, (5) Environment, Technology and Society, (6) Contemporary World and China, (7) Life and Development, (8) Math and Science.

13 credits are required at the undergraduate stage, of which cultural quality education is a compulsory required course with 1-2 credits; cultural quality education of the core courses and the freshman seminar are selected elective courses, and students must choose five courses

or eight credits at least, of which one freshman seminar is suggested; the general cultural quality course is an elective.

The catalog of cultural quality education courses for each semester can be found in the semester course manual.

3. Mathematics and Natural Science Foundation Courses 59 credits

a) Mathematics 21credits

（1） Required Courses 18 credits

10421055	Calculus A (1)	5 credits
10421065	Calculus A (2)	5 credits
10421094	Linear algebra I	4 credits
10420854	Mathematics Experiments	4 credits

（2） Selected elective Courses 3 credits

10420243	Stochastic Mathematical Methods	3 credits	alternative
10420803	An introduction to Probability and Statistics	3 credits	

b) Physics 12 credits

10430484	University Physics B1	4 credits
10430494	University Physics B2	4 credits
10430782	General Physics Laboratory A1	2 credits
10430792	General Physics Laboratory A2	2 credits

c) Chemistry and Biology 26 credits

（1） Required courses 19 credits

20440532	Inorganic & Analytic Chemistry Experiments B	2 credits
20440213	Physical Chemistry A (1)	3 credits
20440151	Experiments of Physical Chemistry B(1)	1 credit
20440224	Physical Chemistry A (2)	4 credits
20440161	Experiments of Physical Chemistry B(2)	1 credit
20440201	Lab. of Organic Chemistry B	1 credit
40440122	Instrumental Analysis B	2 credits
40440011	Instrumental Analysis Experiment B	1 credit
30450014	Principles of Biochemistry	4 credits

（2） Selected elective courses 7 credits

20440314	Inorganic and Analytical Chemistry	4 credits	alternative
20440574	Inorganic & Analytical Chemistry (bilingual)	4 credits	
20440333	Organic Chemistry B	3 credits	alternative
20440613	Organic Chemistry B (bilingual)	3 credits	

d) Basic Engineering Skills courses 13 credits

20220044	Electrical Engineering and Electronics	4 credits
20120273	Engineering Drawing	3 credits

20740073	Computer Programming Fundamentals	3 credits
21510063	Metalworking Technology Practice B (weekly)	3 credits

e) Professional Courses 33 credits

（1） Core Courses 28 credits

20340014	Principles of Chemical Engineering A(1)	4 credits
20340053	Principles of Chemical Engineering A(2)	3 credits
40340173	Principle of Transport Processes	3 credits
30340104	Chemical Reaction Engineering	4 credits
30340123	Thermodynamics of Chemical Engineering	3 credits
40340144	Design of Chemical Processes and Equipment	4 credits
30340162	Chemical Engineering Experiment (2)	2 credits
30340393	Fundamentals of Chemical Systems Engineering	3 credits
30340182	Fundamentals of Biochemical Engineering	2 credits

（2） Selected elective courses 5 credits

30340322	Introduction to Chemical Engineering and Polymer Sciences	2 credits
40340061	Special Topics in the frontiers of Chemical Engineering	1 credit
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40340072	Fluidization Reaction Engineering	2 credits
40340382	Industrial Catalysis	2 credits
40340372	Fundamentals of Polymer Materials Sciences	2 credits
40340132	Petrochemical Engineering Technology	2 credits
40340472	Principles and Application of Genetic Engineering	2 credits
40340492	Industrial Microbes and their Application	2 credits
40340502	Introduction to the Technology of Inorganic Materials	2 credits
30340312	Cell Culture Technology	2 credits
20750011	Document Information Retrieval and Utilization (for Chemistry and related disciplines)	1 credit
40340512	Chemical Safety Systems Engineering	2 credits
40340462	Introduction to Molecular Biology	2 credits
20340073	Research Training Program	3 credits

f) Practical Part 15 credits

12090043	Military theory and skills training	3 credits
30340371	Initial Understanding of Chemical Engineering via Plant Observation	1 credit
	English Practice	2 credits
40340282	Perceptual Practice	2 credits

30340302	Chemical Engineering Experiments (1)	2 credits
40340443	Productive Practice	3 credits
20340062	Chemical Process Simulation	2 credits

g) Diploma Project 15 credits

40340340	Diploma Project (Thesis)	15 credits

The Diploma Project should be no less than 16 weeks, arranged centrally in the seventh and eighth semesters.