

Department of Chemistry

Program of Chemistry for International Students (2024)

I. Introduction

Chemistry is regarded as the central science because of its role in connecting different subjects and its importance in interdisciplinary research, such as chemical biology, materials science, energy, agricultural development, drug discovery and so on.

For the teaching, the comprehensive 4 years credit-based bachelor curriculum in our Department covers a wide range of chemistry aspects and related disciplines with up-to-date literature materials for their selection. Generally it included the four basic chemistry areas as the core courses (organic, inorganic, analytical and physical chemistry), elective courses included but not limited to medicinal chemistry, polymer chemistry, chemical biology, energy and materials chemistry, supramolecular chemistry and environmental chemistry, which are closely related to the frontiers of current research and the needs of our society. Moreover, in order to encourage inter-disciplinary research, the students are motivated to study other science related subjects in the first year of admission, included but not limited to biology, physics and engineering.

Adhering to our university's motto of "Research, Innovation and Entrepreneurship," the Chemistry Department focuses on cultivating students' innovation, critical thinking and ability for interdisciplinary cooperation. The curriculum design emphasizes not only the basic theory, but also practical training particularly in the areas of new medicine, new energy, and new materials. Undergraduates are strongly encouraged to participate in various research programs supervised by professors to cultivate their creativity, practical skills and ability for interdisciplinary cooperation. The department maintains a wide array of sophisticated instrumentation necessary for modern chemical research and teaching.

Therefore, good chemistry training continues to play a substantial role in the rapid development of science and technology in this century and provides students with good prospects in industry, academia, business as well as civil organizations.

Academic subject areas: Chemistry

Program code: 070301

II. Objectives and Learning Outcomes

1. Objectives

The undergraduate Chemistry program is aimed at training new generations of top-notch innovative personnel who have a solid background in mathematics and physics, extensive knowledge of chemistry, strong experimental skills, an international perspective and an entrepreneurial spirit.

2. Learning Outcomes

- 1) Have a high sense of social responsibility and good scientific and cultural literacy.
- 2) Master basic knowledge of mathematics and physics.
- 3) Master the basic theoretical knowledge and experimental skills of chemistry.
- 4) Understand the history、 frontier and development trend of chemistry.
- 5) Have innovation awareness and practical ability and be able to adapt to the future development of science and technology、 economy and society.

III. Study Length, Degree, and Graduation Requirements

1. Study length: 4 years.

2. Degree conferred: Students who complete and meet the degree requirements of the undergraduate program will be awarded a bachelor's degree in Science.

3. The minimum credit requirement for graduation: 149 credits. The specific requirements are as follows.

Module		Category	Minimum Credit Requirement
General Education Courses	Chinese Language and Culture Module	Chinese Language and Culture	16
	Arts and Physical Education Module	Physical Education	4
		Arts	2
	Competence Development Module	Computer Programming	3
		Writing	2
		Foreign Languages	14
	Humanities and Social Sciences Module	Humanities	6
		Social Sciences	
		Chinese Studies	2
	Mathematics and Natural Sciences Module	Mathematics	12
		Physics	10
		Chemistry	3
		Geoscience + Life Science	3
GE to Majors Bridging Module	Introduction to Majors	2	
Major Courses	Major Required Courses	Major Foundational Courses	45
		Major Core Courses	3
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	12
	Major Elective Courses	Major Elective Courses	10
Total			149
Note: please see the General Education Requirement for more details on Chinese Language and Culture Module, Arts and Physical Education Module, Competence Development Module (Foreign Languages & Writing) , Humanities and Social Sciences Module, and GE to Majors Bridging Module.			

IV. Course Requirements for the Mathematics and Natural Sciences Module and Computer

Programming

Course Category	Course Code	Course Name	Credits	Terms	Prerequisite	Dept.
Mathematics	MA117/ MA101a	Calculus I/ Mathematical Analysis I	4/5	1 Fall	None	Department of Mathematics
	MA127/ MA102a	Calculus II/ Mathematical Analysis II	4/5	1 Spring	Calculus I/ Mathematical Analysis I	
	MA113/ MA107	Linear Algebra/ Advanced Linear Algebra I	4	1 Spring & Fall	None	
Physics	PHY105/ PHY101	College Physics I/ General Physics I	4/5	1 Fall	None	Department of Physics
	PHY106/ PHY102	College Physics II/ General Physics II	4/5	1 Spring	College Physics I/ General Physics I	
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spring & Fall	None	
Chemistry	CH103/ CH105	General Chemistry/ Chemistry: The Central Science	4/3	1 Fall	None	Department of Chemistry
Geoscience + Life Science	BIO102B/ BIO103/ EOE100	Introduction to Life Science/ Principles of Biology/ Introduction to Earth Sciences	3	1-2 Spring & Fall	None	Department of Biology/ Department of Earth and Space Sciences
Computer Programming	CS109/ CS110/ CS111/ CS112/ CS113	Introduction to Computer Programming/ Introduction to Java Programming/ Introduction to C Programming/ Introduction to Python Programming/ Introduction to Matlab Programming	3	1-2 Spring & Fall	None	Dept. of Computer Science and Engineering

V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	CH103/ CH105	General Chemistry/Chemistry: The Central Science	None
	MA117/ MA101a	Calculus I/Mathematical Analysis I	None
	MA127/ MA102a	Calculus II/Mathematical Analysis II	Calculus I/Mathematical Analysis I
	PHY105/ PHY101	College Physics I/General Physics I	None
	PHY106/ PHY102	College Physics II/General Physics II	College Physics I/General Physics I
	PHY104B	Experiments of Fundamental Physics	None
Declare major at the end of the second academic year	CH103/ CH105	General Chemistry/Chemistry: The Central Science	None
	MA117/ MA101a	Calculus I/Mathematical Analysis I	None
	MA127/ MA102a	Calculus II/Mathematical Analysis II	Calculus I/Mathematical Analysis I
	PHY105/ PHY101	College Physics I/General Physics I	None
	PHY106/ PHY102	College Physics II/General Physics II	College Physics I/General Physics I
	PHY104B	Experiments of Fundamental Physics	None
	MA113/ MA107	Linear Algebra/Advanced Linear Algebra I	None
	BIO102B/ BIO103/ EOE100	Introduction to Life Science/ Principles of Biology/ Introduction to Earth Sciences	None
<p>Note:</p> <ol style="list-style-type: none"> 1. If the number of students entering a major at the end of the first academic year in the department is greater than or equal to the total number of the teaching-research faculty (PI)*2*60%, all majors in the department may implement the prerequisites for major declaration at the end of the second academic year. 2. If the number of students entering a major at the end of the first academic year in the department is less than the total number of the teaching-research faculty (PI)*2*60%, all majors in the department do not implement the prerequisites for major declaration at the end of the second academic year. 3. Suppose the number of students applying for a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), then the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance). 4. For departments that do not implement prerequisites for major declaration at end of the second academic year, if the cumulative number of students applying for a major at the end of the second academic year and the number of students who have entered a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance). 			

VI: Major Course Arrangement

Table 1: Major Required Courses

Program of Chemistry

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	CH102-15	General Chemistry Laboratory	2	2	1/Spring	General Chemistry/Chemistry: The Central Science	Chem.
	CH203	Organic Chemistry I	4		1/Spring	General Chemistry/Chemistry: The Central Science	Chem.
	CH206	Organic Chemistry II	4		2/Fall	Organic Chemistry I	Chem.
	CH208	Organic Chemistry Laboratory	2	2	2/Fall	General Chemistry Laboratory	Chem.
	CH209	Inorganic Chemistry I	4		2/Fall		Chem.
	CH216	Analytical Chemistry I	3		2/Fall	General Chemistry/Chemistry: The Central Science	Chem.
	CH217	Analytical Chemistry Laboratory I	2	2	2/Fall	General Chemistry/Chemistry: The Central Science	Chem.
	CH301	Physical Chemistry I	4		2/Fall	Calculus II, College Physics II, General Chemistry/Chemistry: The Central Science	Chem.
	CH204	Inorganic Chemistry Laboratory	2	2	2/Spring	General Chemistry Laboratory	Chem.
	CH211	Inorganic Chemistry II	4		2/Spring	Inorganic Chemistry I	Chem.
	CH218	Analytical Chemistry II	3		2/Spring	Analytical Chemistry I, Analytical Chemistry Laboratory I	Chem.
	CH219	Analytical Chemistry Laboratory II	2	2	2/Spring	General Chemistry/Chemistry: The Central Science	Chem.
	CH302	Physical Chemistry II	4		2/Spring	Physical Chemistry I	Chem.
	CH303	Physical Chemistry Laboratory	2	2	3/Fall	General Chemistry/Chemistry: The Central Science	Chem.
	CH304	Structural Chemistry	3		3/Spring	Physical Chemistry II	Chem.
	Total		45	12			
Major Core Courses	CH403	Principle of Chemical Engineering	3		3/Spring	Calculus II, College Physics II	Chem.
	Total		3				
Practice-based Courses	CH491	Degree Thesis (Design)	12	12	4/Fall & Spring		Chem.
	Total		12	12			
Total			60	24			

Table 2: Major Elective Courses**Program of Chemistry**

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CH210	Frontiers of Chemical Science	2		1/Spring		Chem.
CH311	Modern Strategic Synthesis	3		3/Fall	Organic Chemistry II	Chem.
CH312	Organic Spectroscopy	2		3/Fall	Organic Chemistry II	Chem.
CH314	Asymmetric Synthesis	3		3/Fall	Organic Chemistry II	Chem.
CH315	Polymer Chemistry	3		3/Fall	Organic Chemistry II	Chem.
CH317	Medicinal Chemistry	3		3/Fall		Chem.
CH319	Advanced Inorganic Chemistry Laboratory	2	2	3/Fall	Inorganic Chemistry Laboratory	Chem.
CH321	Polymer Chemistry Laboratory	1	1	3/Fall	Polymer Chemistry	Chem.
CH331	Composite materials: science and applications	3		3/Fall		Chem.
CH306	Laboratory for Micro-Nano Synthesis, Technology and Application	2	2	3/Spring	General Chemistry Laboratory	Chem.
CH308	Supramolecular Chemistry	2		3/Spring		Chem.
CH309	Advanced Organic Chemistry Laboratory	2	2	3/Spring	Organic Chemistry II, Organic Chemistry Laboratory	Chem.
CH313	Chemical Biology	3		3/Spring	General Chemistry/Chemistry: The Central Science	Chem.
CH316	Bioinorganic Chemistry	2		3/Spring	General Chemistry/Chemistry: The Central Science	Chem.
CH320	Organic Name Reactions	2		3/Spring	General Chemistry/Chemistry: The Central Science	Chem.
CH323	Natural Product Total Synthesis	2		3/Spring	Organic Chemistry II	Chem.
CH401	Computational Chemistry	3	1	4/Spring	Physical Chemistry II	Chem.
CH481	Projects of Science and Technology Innovation	4	4	3/Fall or Spring		Chem.
Total		44	12			

Note: Major Elective Courses shall not less than 10 Credits.

Table 3: Overview of Practice-based Learning**Program of Chemistry**

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CH102-15	General Chemistry Laboratory	2	2	1/Spring	General Chemistry/Chemistry: The Central Science	Chem.
CH208	Organic Chemistry Laboratory	2	2	2/Fall	General Chemistry Laboratory	Chem.
CH217	Analytical Chemistry Laboratory I	2	2	2/Fall	General Chemistry/Chemistry: The Central Science	Chem.
CH204	Inorganic Chemistry Laboratory	2	2	2/Spring	General Chemistry Laboratory	Chem.
CH219	Analytical Chemistry Laboratory II	2	2	2/Spring	General Chemistry/Chemistry: The Central Science	Chem.
CH303	Physical Chemistry Laboratory	2	2	3/Fall	General Chemistry/Chemistry: The Central Science	Chem.
CH319	Advanced Inorganic Chemistry Laboratory	2	2	3/Fall	Inorganic Chemistry Laboratory	Chem.
CH321	Polymer Chemistry Laboratory	1	1	3/Fall	Polymer Chemistry	Chem.
CH306	Laboratory for Micro-Nano Synthesis, Technology and Application	2	2	3/Spring	General Chemistry Laboratory	Chem.
CH309	Advanced Organic Chemistry Laboratory	2	2	3/Spring	Organic Chemistry II, Organic Chemistry Laboratory	Chem.
CH401	Computational Chemistry	3	1	4/Spring	Physical Chemistry II	Chem.
CH481	Projects of Science and Technology Innovation	4	4	3/Fall or Spring		Chem.
CH491	Degree Thesis (Design)	12	12	4/Fall & Spring		Chem.
Total		38	36			

Curriculum Structure of Chemistry

