**Department of Chemistry**

**Program of Chemistry for International Students (2019)**

## 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, physic 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.

## II. Objectives and Learning Outcomes

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.

## III. Study Length and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Science

The minimum credit requirement for graduation: 135.5 credits (not including English courses);

|  |  |  |
| --- | --- | --- |
| **Category** | **Module** | **Minimum Credit Requirement** |
| General Education (GE) Required Courses（52 creidts） | Science | 32 |
| Physical Education | 4 |
| Chinese Languages & Culture | 16 |
| General Education (GE) Elective Courses（10 creidts） | Humanities | 4 |
| Social Sciences | 4 |
| Arts | 2 |
| Science | 0 |
| Major Course（73.5 creidts） | Major Foundational Courses | 38.5 |
| Major Core Courses | 7 |
| Major Elective Courses | 12 |
| Research Projects, Internship and Undergraduate Thesis / Projects | 16 |
| Total (not including English courses) | 135.5 |

## IV. Discipline

Chemistry

## V. Main Courses

General Chemistry A, General Chemistry Laboratory A, Inorganic Chemistry Fundamentals, Organometallics, Coordination Chemistry, Organic Chemistry I & II, Analytical Chemistry, Principle of Instrumental Analysis, Practice of Instrumental Analysis, Physical Chemistry I & II, Inorganic Chemistry Laboratory, Analytical Chemistry Laboratory, Organic Chemistry Laboratory, Physical Chemistry Laboratory, Principle of Chemical Engineering, and so on.

## VI. Practice-Based Courses

General Chemistry Laboratory A, Inorganic Chemistry Laboratory, Analytical Chemistry Laboratory, Organic Chemistry Laboratory, Physical Chemistry Laboratory, Projects of Science and Technology Innovation, Degree Thesis (Design), and so on.（See Table 3）

## VII. Pre-requisites for Major Declaration

|  |  |  |  |
| --- | --- | --- | --- |
| **Major Declaration Time** | **Course Code** | **Course Name** | **Prerequisite** |
| **Declare major at the end of First Year** | CH101A | General Chemistry A |  |
| CH102-17 | General Chemistry Laboratory A | CH101A |
| CH203 | Organic Chemistry I | CH101A |
| MA101B | Calculus I A |  |
| MA102B | Calculus II A | MA101B |
| PHY103B | General Physics B (I) |  |
| PHY105B | General Physics B (II) | PHY103B |
| PHY104B | Experiments of Fundamental Physics |  |
| **Declare major at the end of Second Year** | CH101A | General Chemistry A |  |
| CH102-17 | General Chemistry Laboratory A | CH101A |
| CH203 | Organic Chemistry I | CH101A |
| CH205 | Analytical Chemistry | CH101A |
| CH213 | Inorganic Chemistry Fundamentals | CH101A |
| CH206 | Organic Chemistry II | CH203 |
| CH214 | Organometallics | CH213 |
| CH215 | Coordination Chemistry | CH213 |
| MA101B | Calculus I A |  |
| MA102B | Calculus II A | MA101B |
| PHY103B | General Physics B (I) |  |
| PHY105B | General Physics B (II) | PHY103B |
| PHY104B | Experiments of Fundamental Physics |  |

## VIII. Requirements for of GE Required Courses

1. **Science Module**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credit** | **Lab Credits** | **Hours/week** | **Term** | **Instruction Language** | **Prerequisite** | **Dept** |
| MA101B | Calculus I A | 4 |  | 4 | Spr/Fall | B/E | NA | MATH |
| MA102B | Calculus II A | 4 |  | 4 | Spr/Fall | B/E | MA101B |
| MA107B | Linear Algebra B | 4 |  | 4 | Spr/Fall | B/E | NA |
| PHY103B | General Physics B (I) | 4 |  | 4 | Spr/Fall | B/E | NA | PHY |
| PHY105B | General Physics B (II) | 4 |  | 4 | Spr/Fall | B/E | PHY103B |
| CH101A | General Chemistry A | 4 |  | 4 | Spr/Fall | B/E | NA | CHEM |
| CS102B | Introduction to Computer Programming B | 3 | 1 | 4 | Spr/Fall | B/E | NA | CSE |
| BIO102B | Introduction to Life Science | 3 |  | 3 | Spr/Fall | B/E | NA | BIO |
| PHY104B | Experiments of Fundamental Physics | 2 | 2 | 4 | Spr/Fall | B/E | NA | PHY |
| Total | 32 | 3 | 35 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credit** | **Lab Credits** | **Hours/week** | **Term** | **Instruction Language** | **Prerequisite** | **Dept** |
| GE131 | Physical Education I | 1 |  | 2 | 1/Fall |  | NA | PE Center |
| GE132 | Physical Education II | 1 |  | 2 | 1/Spr |  | NA |
| GE231 | Physical Education III | 1 |  | 2 | 2/Fall |  | NA |
| GE232 | Physical Education IV | 1 |  | 2 | 2/Spr |  | NA |
| Total | 4 |  | 8 |  |  |  |  |

 **(II) Physical Education**

**(III) Chinese Languages & Culture**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credit** | **Hours/week** | **Term** | **Instruction Language** | **Prerequisite** | **Dept** |
| CLE008 | Elementary Chinese I | 2 | 4 | 1/Fall | B | NA | CLE |
| CLE009 | Elementary Chinese II | 2 | 4 | 1/Spr | B | CLE008 |
| CLE027 | Intermediate Chinese I | 2 | 4 | 2/Fall | B | CLE009 |
| CLE028 | Intermediate Chinese II | 2 | 4 | 2/Spr | B | CLE027 |
| CLE031 | Advanced Chinese I | 2 | 4 | 3/Fall | B | CLE028 |
| CLE032 | Advanced Chinese II | 2 | 4 | 3/Spr | B | CLE031 |
| CLE033 | Chinese Culture | 2 | 2 | Spr/Fall | B/E | NA | CLE/HUM/SSC |
| CLE034 | Chinese History | 2 | 2 | Spr/Fall | B/E | NA |

**(IV) English Language**

All students are required to undertake the English Placement Test before selecting courses, based on which students will be assigned to 3 levels to be ready for the courses with English as the instruction language.

SUSTech English III, English for Academic Purposes are required for Level A.

SUTech English II, SUSTech English III, English for Academic Purposes for Level B.

SUSTech English I, SUSTech English II, SUSTech English III, English for Academic for Level C.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credit** | **Hours/week** | **Instruction Language** | **Prerequisite** | **Dept** |
| CLE021 | SUSTech English I | 4 | 4 | E | NA | CLE |
| CLE022 | SUSTech English II | 4 | 4 | E | CLE021 |
| CLE023 | SUSTech English III | 4 | 4 | E | CLE022 |
| CLE030 | English for Academic Purposes | 2 | 2 | E | CLE023 |

## IX Requirements for of GE Elective Courses

Students are required to complete 4 credits for the Humanities Module and Social Sciences Module respectively, and 2 credits for the Music and Art Module. (Information about the available courses and the instruction language will be announced before the course selection session)

## X. Major Course Arrangement

**Table 1: Major Required Course (Foundational and Core Courses)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Category** | **Course Code** | **Course Name** | **Credits** | **Lab Credits** | **Hours/week** | **Terms** | **Advised term to take the course**  | **Instruction language** | **Prerequisite** | **Dept.** |
| **Major Foundational Courses** | CH102-17 | General Chemistry Laboratory A | 1.5 | 1.5 | 3 | Spr | 1/ Spr | B | CH101A | Chem. |
| CH203 | Organic Chemistry I | 4 |  | 4 | Spr | 1/ Spr | B | CH101A | Chem. |
| CH206 | Organic Chemistry II | 4 |  | 4 | Fall | 2/ Fall | B | CH203 | Chem. |
| CH208 | Organic Chemistry Laboratory | 2 | 2 | 4 | Fall | 2/ Fall | B | CH203, CH102-17 | Chem. |
| CH213 | Inorganic Chemistry Fundamentals | 3 |  | 3 | Fall | 2/ Fall | B | CH101A | Chem. |
| CH205 | Analytical Chemistry | 4 |  | 4 | Fall | 2/ Fall | B | CH101A | Chem. |
| CH207 | Analytical Chemistry Laboratory | 2 | 2 | 4 | Fall | 2/ Fall | B | CH205 | Chem. |
| CH214 | Organometallics | 3 |  | 3 | Spr | 2/ Spr | E | CH213 | Chem. |
| CH215 | Coordination Chemistry | 3 |  | 3 | Spr | 2/ Spr | E | CH213 | Chem. |
| CH204 | Inorganic Chemistry Laboratory | 2 | 2 | 4 | Spr | 2/ Spr | B | CH213, CH102-17 | Chem. |
| CH301 | Physical Chemistry I | 4 |  | 4 | Fall | 3/ Fall | B | MA102B, PHY105B, CH101A | Chem. |
| CH303 | Physical Chemistry Laboratory | 2 | 2 | 4 | Fall | 3/ Fall | B | CH301 | Chem. |
| CH302 | Physical Chemistry II | 4 |  | 4 | Spr | 3/ Spr | B | CH301 | Chem. |
| **Total** | **38.5** | **9.5** | **48** |  |  |  |  |  |
| **Major Core Courses** | CH305-1 | Principle of Instrumental Analysis | 2 |  | 2 | Spr | 2/ Spr | B | CH205, CH207 | Chem. |
| CH305-2 | Practice of Instrumental Analysis | 2 | 2 | 4 | Spr | 2/ Spr | C | CH305-1 | Chem. |
| CH403 | Principle of Chemical Engineering | 3 |  | 3 | Spr/ Fall | 4/ Fall | B | MA102B, PHY105B | Chem. |
| **Total** | **7** | **2** | **9** |  |  |  |  |  |
| **Major Practical Courses**  | CH480 | Projects of Science and Technology Innovation | 8 | 8 | 8 | Fall & Spr | 3/ Fall & Spr |  |  | Chem. |
| CH490 | Degree Thesis (Design) | 8 | 8 | 8 | Fall & Spr | 4/ Fall & Spr |  |  | Chem. |
| **Total** | **16** | **16** | **16** |  |  |  |  |  |
| **Total** | **61.5** | **27.5** | **73** |  |  |  |  |  |

**Table 2: Major Elective Courses**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Lab Credits** | **Hours/week** | **Terms** | **Advised term to take the course**  | **Instruction language** | **Prerequisite** | **Dept.** |
| CH210 | Frontiers of Chemical Science | 2 |  | 2 | Spr | 1/ Spr | B |  | Chem. |
| CH308-14 | Supramolecular Chemistry | 3 |  | 3 | Fall | 3/ Fall | B | CH206, CH301 | Chem. |
| CH311 | Modern Strategic Synthesis | 3 |  | 3 | Fall | 3/ Fall | B | CH206, CH214, CH215 | Chem. |
| CH313 | Chemical Biology | 3 |  | 3 | Fall | 3/ Fall | B | CH206 | Chem. |
| CH315 | Polymer Chemistry | 3 |  | 3 | Fall | 3/ Fall | B | CH206 | Chem. |
| CH317 | Medicinal Chemistry | 3 |  | 3 | Fall | 3/ Fall | C | CH206 | Chem. |
| CH319 | Advanced Inorganic Chemistry Laboratory | 2 | 2 | 4 | Fall | 3/ Fall | B | CH214, CH215, CH204 | Chem. |
| CH321 | Polymer Chemistry Laboratory | 1 | 1 | 2 | Fall | 3/ Fall | B | CH315 | Chem. |
| CH324 | Element-Organic Chemistry | 2 |  | 2 | Fall | 3/ Fall | B | CH214, CH215 | Chem. |
| CH329 | Stereochemistry & Chiral Synthesis | 3 |  | 3 | Fall | 3/ Fall | B | CH206 | Chem. |
| CH304 | Nanomaterials Synthesis and Nanotechnology | 2 |  | 2 | Spr | 3/ Spr | E | CH214, CH215, CH301 | Chem. |
| CH306 | Laboratory for Micro-Nano Synthesis, Technology and Application | 2 | 2 | 4 | Spr | 3/ Spr | B | CH214, CH215, CH301 | Chem. |
| CH309 | Advanced Organic Chemistry Laboratory | 2 | 2 | 4 | Spr | 3/ Spr | B | CH206, CH208 | Chem. |
| CH312 | Organic Spectroscopy | 2 |  | 2 | Spr | 3/ Spr | C | CH206 | Chem. |
| CH316 | Bioinorganic Chemistry | 2 |  | 2 | Spr | 3/ Spr | E | CH101A | Chem. |
| CH320 | Organic Name Reactions | 2 |  | 2 | Spr | 3/ Spr | B | CH101A | Chem. |
| CH322 | Advanced Mass Spectrometry Analysis | 2 | 1 | 3 | Spr | 3/ Spr | B | CH205 | Chem. |
| CH323 | Natural Product Total Synthesis | 2 |  | 2 | Spr | 3/ Spr | B | CH206 | Chem. |
| CH212-16 | Advanced Instrumentation Systems I | 4 | 2 | 6 | Spr | 3/ Spr | E | CH101A | Chem. |
| CH307-13 | Advanced Instrumentation Systems II | 2 | 2 | 4 | Fall | 4/ Fall | E | CH212-16 | Chem. |
| CH401 | Computational Chemistry | 3 | 1 | 4 | Fall | 4/ Fall | C | CH302 | Chem. |
| CH409 | Organic Optoelectronic Materials and Devices | 4 | 1 | 5 | Fall | 4/ Fall | E | CH206 | Chem. |
| CH410 | Cosmetic Chemistry and Formula | 3 | 1 | 4 | Fall | 4/ Fall | B | CH208 | Chem. |
| CHEMS001 | Frontiers of Chemical Science（Summer） | 1 |  | 1 | Smr | 2/ Smr | B |  | Chem. |
| CHEMS002 | General Chemistry Laboratory B | 0.5 | 0.5 | 1 | Smr | 1/ Smr | B | CH102-17 | Chem. |
| **Total** | **58.5** | **15.5** | **74** |  |  |  |  |  |

**Table 3: Overview of Practice-Based Courses**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Lab Credits** | **Hours/week** | **Terms** | **Advised term to take the course**  | **Instruction language** | **Prerequisite** | **Dept.** |
| CH102-17 | General Chemistry Laboratory A | 1.5 | 1.5 | 3 | Spr | 1/ Spr | B | CH101A | Chem. |
| CHEMS002 | General Chemistry Laboratory B | 0.5 | 0.5 | 1 | Smr | 1/ Smr | B | CH102-17 | Chem. |
| CH208 | Organic Chemistry Laboratory | 2 | 2 | 4 | Fall | 2/ Fall | B | CH203, CH102-17 | Chem. |
| CH207 | Analytical Chemistry Laboratory | 2 | 2 | 4 | Fall | 2/ Fall | B | CH205 | Chem. |
| CH204 | Inorganic Chemistry Laboratory | 2 | 2 | 4 | Spr | 2/ Spr | B | CH213, CH102-17 | Chem. |
| CH305-2 | Practice of Instrumental Analysis | 2 | 2 | 4 | Spr | 2/ Spr | C | CH305-1 | Chem. |
| CH303 | Physical Chemistry Laboratory | 2 | 2 | 4 | Fall | 3/ Fall | B | CH301 | Chem. |
| CH319 | Advanced Inorganic Chemistry Laboratory | 2 | 2 | 4 | Fall | 3/ Fall | B | CH214, CH215, CH204 | Chem. |
| CH321 | Polymer Chemistry Laboratory | 1 | 1 | 2 | Fall | 3/ Fall | B | CH315 | Chem. |
| CH306 | Laboratory for Micro-Nano Synthesis, Technology and Application | 2 | 2 | 4 | Spr | 3/ Spr | E | CH214, CH215, CH301 | Chem. |
| CH309 | Advanced Organic Chemistry Laboratory | 2 | 2 | 4 | Spr | 3/ Spr | B | CH206, CH208 | Chem. |
| CH322 | Advanced Mass Spectrometry Analysis | 2 | 1 | 3 | Spr | 3/ Spr | B | CH205 | Chem. |
| CH212-16 | Advanced Instrumentation Systems I | 4 | 2 | 6 | Spr | 3/ Spr | E | CH101A | Chem. |
| CH307-13 | Advanced Instrumentation Systems II | 2 | 2 | 4 | Fall | 4/ Fall | E | CH212-16 | Chem. |
| CH401 | Computational Chemistry | 3 | 1 | 4 | Fall | 4/ Fall | C | CH302 | Chem. |
| CH409 | Organic Optoelectronic Materials and Devices | 4 | 1 | 5 | Fall | 4/ Fall | E | CH206 | Chem. |
| CH410 | Cosmetic Chemistry and Formula | 3 | 1 | 4 | Fall | 4/ Fall | B | CH208 | Chem. |
| CH480 | Projects of Science and Technology Innovation | 8 | 8 | 8 | Fall & Spr | 3/ Fall & Spr |  |  | Chem. |
| CH490 | Degree Thesis (Design) | 8 | 8 | 8 | Fall & Spr | 4/ Fall & Spr |  |  | Chem. |
| **Total** | **53** | **43** | **80** |  |  |  |  |  |

**Table 4: Overview of Course Hours and Credits**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category** | **Total Course Hours** | **Total Credits** | **Credit Requirements** | **Percentage of the Total\*** |
| **General Education (GE) Required Courses (not including English courses)** |  | **52** | **52** | **38%** |
| **General Education (GE) Elective Courses** |  |  | **10** | **7%** |
| **Major Foundational Courses** | **768** | **38.5** | **38.5** | **29%** |
| **Major Core Courses** | **144** | **7** | **7** | **5%** |
| **Major Elective Courses** | **1184** | **58.5** | **12** | **9%** |
| **Research Projects, Internship****and Undergraduate Thesis/Projects** | **512** | **16** | **16** | **12%** |
| **Total****(not including English courses)** |  |  | **135.5** | **100%** |

**\*** Percentage of the total= Credit requirements of each line / Total credit requirements

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## Recommended Plan for Courses Selection of Chemistry Program (not including English courses)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fall | First Year | Credits | Second Year | Credits | Third Year | Credits | Fourth Year | Credits |
| General Chemistry A | 4 | Organic Chemistry II | 4 | Physical Chemistry I | 4 | Principle of Chemical Engineering | 3 |
| Calculus I A | 4 | Organic Chemistry Laboratory | 2 | Physical Chemistry Laboratory | 2 | Major Elective Courses | 2 |
| Linear Algebra B | 4 | Analytical Chemistry | 4 | Major Elective Courses | 5 | GE Elective Courses | 2 |
| General Physics B (I) | 4 | Analytical Chemistry Laboratory | 2 | Advanced Chinese I | 2 | Degree Thesis (Design) (1 year) |  |
| Physical Education I | 1 | Inorganic Chemistry Fundamentals | 3 | GE Elective Courses | 4 |  |  |
| Elementary Chinese I | 2 | Physical Education III | 1 | Projects of Science and Technology Innovation (1 year) |  |  |  |
|  |  | Intermediate Chinese I | 2 |  |  |
|  |  | Introduction to Computer Programming B | 3 |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Total | 19 | Total | 21 | Total | 17 | Total | 7 |
| Spring | General Chemistry Laboratory A | 1.5 | Organometallics | 3 | Physical Chemistry II | 4 | Degree Thesis (Design) (1 year) |  |
| Organic Chemistry I | 4 | Coordination Chemistry | 3 | Major Elective Courses | 5 |  |  |
| Calculus II A | 4 | Inorganic Chemistry Laboratory | 2 | Advanced Chinese II | 2 |  |  |
| General Physics B (II) | 4 | Principle of Instrumental Analysis | 2 | Chinese Hirtory | 2 |  |  |
| Experiments of Fundamental Physics | 2 | Practice of Instrumental Analysis | 2 | GE Elective Courses | 4 |  |  |
| Physical Education II | 1 | Physical Education IV | 1 | Projects of Science and Technology Innovation (1 year) |  |  |  |
| Elementary Chinese II | 2 | Intermediate Chinese II | 2 |  |  |
|  |  | Chinese Culture | 2 |  |  |  |  |
|  |  | Introduction to Life Science | 3 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Total | 18.5 | Total | 20 | Total | 17 |  |  |
| Summer |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Total |  | Total |  | Total |  | Total |  |