

# **School of Medicine**

## **Program of Biomedical Sciences for International Students (2023)**

### **I. Introduction**

Biomedical science is a frontier interdisciplinary subject that integrates the theories and methods of basic medicine, biology and life science. The School of Medicine is staffed with the world's top scientists in the fields of biomedicine, including oncology, drug research and development, nervous system diseases, aging related diseases, pathogenic microorganisms, cardiovascular diseases, public health, precision medicine and big data analyses, intelligent medicine. The School of Medicine provides the students with the world's leading teaching and research resources. Students will carry out pioneering scientific research projects independently with the guidance of professors. Students from this major will go to one of the affiliated hospitals for an introductory training in clinical medicine in their senior year. The program provides an internationally competitive curriculum and one-to-one guidance to cultivate students' solid basic biomedical knowledge and innovative skills.

Academic subject areas: Preclinical Medicine (1001) ;

Program code: Basic Medicine 100103T

### **II. Objectives and Learning Outcomes**

#### 1. Objectives

This program aims to train innovative research talents with knowledge of basic medicine and life sciences, aiming for developing strong experimental skills, ability of problem-solving, teamwork, lifelong learning to achieve international competitiveness by systematic learning and training.

#### 2. Learning Outcomes

1. Master the biomedical knowledge in natural science, humanity, and social science.
2. Master the basic knowledge of basic medicine (e.g. physiology and pathophysiology, pathology, histology and embryology, medical immunology, etc.). Be familiar with the morphological and

functional changes of human body in regard to molecules, cells and tissues, and the principles of these changes.

3. Master the basic scientific thinking and experimental techniques, with data analysis, literature retrieval, information acquisition and analysis.

4. Communicate effectively in both Chinese and English. Be able to read English academic literature, and have strong academic communication ability.

### 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: 157 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	4
Geoscience + Life Science		3	
GE to Majors Bridging Module	Introduction to Majors	2	
Major Courses	Major Required Courses	Major Foundational Courses	19
		Major Core Courses	30
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	18

	Major Elective Courses	Major Elective Courses	10
Total			157
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 Introduction to Majors 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	Calculus I	4	1 Fall	None	Department of Mathematics
	MA127	Calculus II	4	1 Spring	Calculus I	
	MA113	Linear Algebra	4	1 Spring & Fall	None	
Physics	PHY105	College Physics I	4	1 Fall	None	Department of Physics
	PHY106	College Physics II	4	1 Spring	College Physics I	
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spring & Fall	None	
Chemistry	CH103	General Chemistry	4	1-2 Spring & Fall	None	Department of Chemistry
Geoscience + Life Science	BIO103	Principles of Biology	3	1-2 Spring & Fall	None	Department of Biology
Computer Programming	CS112	Introduction to Python Programming Python	3	1-2 Spring & Fall	None	Dept. of Computer Science and Engineering
Note: 1. For Mathematics Category, students can take Mathematical Analysis I and II, or Single-variable Calculus and Multivariable Calculus as alternatives to Calculus I and II; Advanced Linear Algebra I as an alternative to Linear Algebra. 2. For Physics Category, students can take General Physics I and II as alternatives to College Physics I and II. 3. For Computer Programming Category, students can choose any one of the five computer programming courses. 4. The above alternative courses are also applicable to "Prerequisites for Major Declaration".						

## V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	CH103	General Chemistry	
	BIO103	Principles of Biology	
Declare major at the end of the second academic year	MA117	Calculus I	
	PHY105	College Physics I	
	CH103	General Chemistry	
	BIO103	Principles of Biology	

Note:

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 Biomedical Sciences

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	MED105	Medical Organic Chemistry	4		2/Fall		MED
	MED221	Molecular Microbiology	3		2/Fall		MED
	MED219	Advanced Molecular Biology	3		2/Fall		MED
	MED205	Medical Cell Biology	3		2/Spring		MED
	MED203	Medical Biochemistry	3		2/Spring		MED
	MED206	Basic Biomedical Laboratory	2	2	2/Spring		MED
	MED216	Medical Microbiology Laboratory	1	1	2/Spring		MED
	Total		19	3			
Major Core Courses	MED306	Histology & Embryology	3	1	2/Fall		MED
	MED304	Physiology & Pathophysiology I	3		2/Fall		MED
	MED339	Human Function & Pharmacology Laboratory	2	2	3/Fall		MED
	MED305	Physiology & Pathophysiology II	3		3/Fall	MED304	MED
	MED405	Medical Immunology	3		3/Fall		MED
	MED307	Pathology	3	1	3/Spring	MED306	MED
	MED404	Medical Genetics	3		3/Spring		MED
	MED301	Biomedical Ethics	2		3/Spring		MED
	MED340	Biomedical Laboratory A	2	2	3/Spring		MED
	MED309	Medical Neurobiology	3		4/Fall		MED
	MED226	Experimental Methodology and Application of Molecular Biology	3		4/Spring		MED
	Total		30	6			
	MED481	Projects of Science and	2	2	3/Fall		MED

<b>Practice-based Courses</b>		Technology Innovation I				
	MED482	Projects of Science and Technology Innovation II	2	2	3/Spring	MED
	MED483	Projects of Science and Technology Innovation III	2	2	4/Fall	MED
	MED491	Thesis of Biomedical Sciences	12	12	4/Spring	MED
<b>Total</b>			18	18		
<b>Total</b>			67	27		

Note: The Projects of Science and Technology Innovation starts from the 3rd year. The project must be conducted under the supervision of a professor from School of Medicine.

**Table 2: Major Elective Courses**

**Program of Biomedical Sciences**

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
MED103	History of Medicine	2		2/Fall		MED
MED107	Medical Economics	2		2/Spring		MED
MED111	Introduction to Hospital Administration	2		2/Spring		MED
MED102	Medical English	2		2/Spring		MED
MED215	Medical Literature Retrieval and Writing	1		2/Spring		MED
MED227	Introduction to Modern Virology	3		3/Fall		MED
MED333	Cancer Biology Principles	3		3/Fall		MED
MED218	Medical Epigenetics	3		3/Fall		MED
MED217	Evidence based medicine methodology and clinical trial	2		3/Spring		MED
MED335	Structural Biology and Modern Pharmaceutical Research	3		3/Spring		MED
MED302	Preventive Medicine	2		3/Spring		MED
MED323	Genetic counseling	2	2	4/Fall	MED404	MED
MED341	Scientific thinking	2		4/Spring		MED
MED401	Biomedical Research Methods	2		4/Spring		MED
<b>Total</b>		31	2			

Note: Minimum credits requirement of the above elective courses is **10** credits.

**Table 3: Overview of Practice-based Learning****Program of Biomedical Sciences**

<b>Course Code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Practice-based Learning Credits</b>	<b>Terms</b>	<b>Prerequisite</b>	<b>Dept.</b>
MED206	Basic Biomedical Laboratory	2	2	2/Spring		MED
MED216	Medical Microbiology Laboratory	1	1	2/Spring		MED
MED306	Histology & Embryology	3	1	2/Fall		MED
MED339	Human Function & Pharmacology Laboratory	2	2	3/Fall		MED
MED307	Pathology	3	1	3/Spring	MED306	MED
MED340	Biomedical Laboratory A	2	2	3/Spring		MED
MED481	Projects of Science and Technology Innovation I	2	2	3/Fall		MED
MED482	Projects of Science and Technology Innovation II	2	2	3/Spring		MED
MED483	Projects of Science and Technology Innovation III	2	2	4/Fall		MED
MED491	Thesis of Biomedical Sciences	12	12	4/Spring		MED
Total		31	27			

# Curriculum Structure of Biomedical Sciences

- Major Core Courses
- Major Foundational Courses
- Practice-Based Courses
- General Education Courses

<b>Year 4 - Spring</b>	Experimental methodology and application of molecular biology							Thesis											
<b>Year 4 - Fall</b>	Medical Neurobiology																		
<b>Year 3 - Spring</b>	Medical Genetics	Pathology	Biomedical Lab	Biomedical Ethics					Projects of Science and Technology Innovation I-III										
<b>Year 3 - Fall</b>	Physiology & Pathophysiology II	Human Function & PHarmacology Lab	Medical Immunology																
<b>Year 2 - Spring</b>	Medical Biochemistry	Basic Biomedical Lab		Medical Microbiology Lab	Medical Cell Biology														
<b>Year 2 - Fall</b>	Medical Organic Chemistry	Advanced Molecular Biology	Molecular Microbiology	Physiology & Pathophysiology I		Histology & Embryology													
<b>Year 1 - Spring</b>	Calculus I	College Physics I		Principles of Biology		Introduction to Python Programming		Introduction to Majors Module		Foreign Languages		Writing/Chinese Studies		Chinese Language and Culture Module		Arts and Physical Education Module		Humanities and Social Sciences Module	
<b>Year 1 - Fall</b>	Calculus II	College Physics II		General Chemistry															