Biology

生物学

(071000)

1. Overview of the Program

School of life science researches started from 1980s in Beijing Institute of Technology, primarily supporting the Master and Doctor Program in applied chemistry. In 1995, department of Biology Engineering was authorized began to recruit master and doctor programs in this major, respectively in 2000 and 2005. For the disciplinary progress of fundamental biology, school of life science was authorized to award degree in biochemistry and molecular biology in 2003, microbiology and neurology in 2005. Furthermore, biochemistry and biology are approved as key discipline of national defense in 2007. And in 2010, biology was conferred as a first class discipline, underlying a promising development of engineering disciplines. So far, there are four principal research orientations in biology first class disciplines: Biochemistry &Molecular Biology, Microbiology, Neurobiology and Cellular Biology. Introductions as follows:

1. Biochemistry & Molecular Biology: (1) structure, function and regulation of biomacromolecules. It focuses on the research on novel drug targets and endogenous pathogenic matter responsible for major human disorders. Structure and molecular design of proteins with specificity function; application of trip-repeat nucleotide fragments in gene expression and regulation. (2) Technology of biochemical analysis and separation. It stresses studies of new approaches and applications of biochemical analysis and separation, including the biology separation medium and ligands development and their use in chromatography realm; application of lowabundant protein concentrating technique, HighPerformanceLiquid Chromatography, electrophoresis, capillaryelectrochromatography in biochemical analysis and separation, drug selection and proteomics; researches on new-type quantum dots and biosensors. (3) Applied chemistry and molecular biology. It aims at the cross disciplinary fields of biology, chemistry, material science, engineering and space biology, including high-sensitive molecular detection technology for nucleic acid, molecular mechanisms of the interaction between biomaterial or bioactivity material between tissue and cells, design and application of biomaterials, aptamer and vectors, etc.

2. Applied microbiology technology: (1) Biotransformation and Synthetic Biosystem: Recombination and synthesis of new, specific functional artificial microbial systems by engineering strategies for production applications. Research areas cover microbial metabolism, regulation and its molecular mechanisms, as well as the reorganization of microbial metabolic pathways. (2) Space microbial biotechnology: to study the growth, metabolism and the gene expression mechanism of microorganism under the space condition and explore new methods for drug development and waste clearance in space with the assistance of microorganism. With the researches on space microbe culture techniques, create space culture system suitable for diverse categories of microbes with a measurable and controllable loading style. (3)microorganism metabolism and gene engineering: to research the metabolism, regulation and mechanism of microorganism, reconstruction of microbe metabolism, modification of geneticallyengineered bacterium, RNA interference in bacterial model, taking advantage of microbe and its enzyme to process and transform some certain substance to ensure the cleanness and efficacy.

3. Neuroscience: (1) study molecular mechanism of neuronal disease: for neurodegenerative disorders and vascular diseases. To clarify the molecular mechanism, pathology and possible treatment of Parkinson's disease, Alzheimer’s Disease, cerebrovascular disease and psychosis via advanced approaches and techniques such as proteomics, biochemical analysis and separation, molecular biology, etc. (2) space neurology and immunology: to investigate the biological alteration its mechanism of nervous system, the interaction between nervous and immune systems and their signaling pathways’ changes, nervous system development, neuronal apoptosis caused by oxidative damage and its prevention, neuron stem cells development and its role in repair the nervous system trauma, ergonomic evaluation for space and confined capsule human-machine-environment, fundamental space neurobiology medicine study, etc. (3) research on new technology and approaches for neurobiology: to discuss application of proteomics and metabonomics, new labeling and quantitative technique in neurobiology study. Apply to Biological mass spectrometry, HPLC-MS, two-dimensional electrophoresis techniques in and other nervous system diseases associated protein used in highly sensitive quantitative analysis; proteome level in exploring the etiology of neurological diseases and its regulation. Neurobiological research on the application of nanotechnology, new techniques and methods of labeling, the molecules, cells, and neural elements on the individual level for rapid and sensitive marker, and real-time detection of dynamic trace.

4. Cellular and molecular regulation mechanisms and applications:

(1)Effects of Spatial Microgravity and Radiation on the Growth, Differentiation and Function of Different Cells in the Body；

(2)Molecular biological basis and structure-activity relationships of biologically active substances for the prevention and treatment of tumors, neurodegenerative diseases and diabetes; molecular mechanisms of neurological and cardiovascular damage, drug countermeasures and protective measures under conditions of aerospace weight loss; weightless pharmacokinetics and metabolic patterns the study.

After several years of efforts and dedication, school of life science owns a creative, active and cooperative faculty team. They are focusing on the cutting-edged international issues, highlighting the importance of academic communication, making efforts to combine their well-structured knowledge system with practice and contributing to earn national and international influence. Among which, there are 12 professors, 12 associate professors, 2 lecturers. More than 90% have PhD degree, and 1/3 of them have oversea experience for more than 1 year. Faculties of our school have undertaken many Research Grants, such as the National High Technology Research Grant and Development Program of China Grant (863 Program), the National Basic Research Program of China Grant (973 Program), the National Natural Science Foundations of China (NSFC) and national, provincial and ministerial project of defense pre-research and civil aerospace. There are more than 120 published papers cited by SCI, EI and ISTP per year.

2. Training Target

The target is to train high-level innovative talents who have a good knowledge of international common sense, with the ability of spreading Chinese and foreign cultures occupied, so that to bring international graduate students into full play as a cultural bridge.

3. Length of Schooling

The basic length of schooling for master students is 2 years. In principle, students should complete the courses in the first academic year. Thesis work time should not be less than one year. The maximum length of study for master students is extended by 0.5 years on the basis of 2 years.

4. Curriculum and Credit Requirements

Course Classification		**Course Code**	**Course Name**	**Course Hours**	**Credits**	**Semester**	**Requirements**	**Master /Ph.D.**	**Credits Requirement**
Public Course		3700001	Chinese Language 汉语	96	3+3	1+2	Compulsory	Master	Master≥8
		3700002	Outline of China 中国概况	32	2	1/2	Compulsory	Master	
Major Basic Courses		1601001	Modern Biochemistry 现代生物化学	32	2	2	Compulsory	Master	Master≥2
Optional Course	Major Core Courses	1601002	Current Opinion in Life science and Biotechnology 现代生命科学与生物技术述评	32	2	1	Optional	Master	Master≥4
		1601003	Neurobiology 神经生物学	32	2	2	Optional	Master	
		1601004	Molecular Immunity 分子免疫学	32	2	2	Optional	Master	
		1601005	Applied Biopharmaceutics&Pharmacokinetics 实用生物药剂学与药物动力学	32	2	1	Optional	Master	

	Major Optional course	1601006	Advance Experimental in Biochemistry and Moleaular biology 高级生物化学与分子生物学实验	48	3	2	Optional	Master	Master≥4
		1601007	Modern Neurobiological Technology and Method 现代神经生物技术与方法	32	2	2	Optional		
		Other major course（Chinese or English）					Optional		
Total Credits		Master≥18 credits							

Notes：

1. Public Course

(1)Chinese Language: Set by International Students Center of BIT. All international students must take this compulsory course.

(2)Outline of China: Set by International Students Center of BIT. All international students must take this compulsory course.

2. Major Basic Courses

Different Programs can set their own Major Basic Course.

3. Optional Course

(1) Major Core Courses

Different Programs can set their own Major Core Course.

(2)Major Optional course

Master international students must take two optional courses of their own Program. Under the guidance of the supervisor, Master international students can take undergraduate courses if needed.

5. Practice Part

1. Academic Activity (1 credit)

International Graduate Students need to participate in academic activities, academic lectures and academic conferences of their own fields. Giving oral speeches on academic conferences, whether on or off campus, are highly recommended.

2. Innovative Practice (1 credit)

International Graduate Students should take scientific research training and social practices during their training period, which should be carried-out and evaluated by supervisors.

6. The Dissertation Related Work

1. Literature Review & Opening Report

Under the guidance of the supervisor, International Graduate Students should pick a research direction as well as reading certain amount reference books, both Chinese or foreign languages, at the same time.

Master students should write a literature review, no less than 4000 words, based on the reading of over 30 papers , both Chinese or foreign languages, of their own research field.

On the basis of the Literature Review, the Opening Report should mainly introduce following factors: research target, research meaning, methods of research, technical route, implementary plan, arrangements and expected

2. Mid-Term Evaluation

Schools organize Mid-Term Evaluation for International Students, which includes the evaluations of course study, literature review, opening report and the research progress of publishing papers and writing of Degree thesis.

3. Thesis Writing

International Graduate Students should complete a Degree thesis under the guidance of supervisors.

4. Thesis Defense

After thesis approved and the Sub- Committee of Degree Assessment authorized, International Graduate Students can take the Thesis-Defense.

5. Degree Conferment

International students should acquire certain academic results as regulated when applying for a Master Degree. Each program should clarify the categories of Master Degree.

Time nodes of relevant procedure

The Dissertation Related Work	Master
Literature Review& Opening Report	Before week 1 of the 3rd semester
Mid-Term Evaluation	week 1-2 of the 4rd semester
Thesis Pre-Defense	——
Thesis Defense	At least 9 months after the Opening Report
Degree Application	The application should be raised in a certain time after the Thesis Defense

7. Course Syllabus

Course Code，Course Name，Class Hour，Credits，Course Description and Course Target，Teaching Method，Evaluation and Exams，Suitable Specialty，Prerequisites，Course Contents，Reference.