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**Course Number: 0007080**

**Course Title: Freshmen Seminar Course**

**Credit: 1 Total Credit Hours: 16**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** None

**Evaluation Method:** Report

**Course Description:**

Freshmen Seminars Course is opened for the first-year biomedical engineering freshmen to guide students' exploration and research, emphasizing teacher-student interaction and independent learning courses. The course is conducted in forms of the academic report, visiting, research and discussion. The course is designed to create a collaborative learning environment for new students, to develop students' inquiry-based learning habits and learning ability. The course can lay a good foundation for the students to a higher level of learning and research.

**Recommended Textbooks/References:**

1. DENG Yulin, et al. Biomedical Engineering, Science Press, 2007

**Course Number: 0005622**

**Course Title: Anatomy and Physiology**

**Credit: 2.5 Total Credit Hours: 40**

**Availability:** Available to Undergraduate in Bioengineering

**Pre-requisites:** None

**Assessment:** Exam

**Course Description:**

The course of Anatomy and Physiology is to explain the human life's process and its living reality, so as to master the objective laws and relevant effect. By finishing the course, the student will have the ability to explain the relations between the forms and function, the parts and the whole, the organs and the environment, the balance and the unbalance, the healthy and the disease.

**Recommended Textbooks/References:**

1. ZHU Danian (editor in chief), Physiology (7th edition), People's Hygiene Press, 2010 Human Anatomy Physiology (5th edition), Yue Limin, Cui Huixian (editors in chief), People's Hygiene Press, 2007
2. Yao Tai (editor in chief), Physiology (5th edition), People's Hygiene Press, 2001

**Course Number: 0000330**

**Course Title: Foundation of C Language Programming**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Foundation of computer, Theory and application of computer, Visual basic

**Evaluation Method:** Written Exam

**Course Description:**

This course is a fundamental subject course for undergraduate students not majored in computer science in engineering colleges. The emphases of this course are not only learning the basic

knowledge of programming language, but also training the skill of programming design. With the studying of this course, students can gradually grasp the fundamental contents, such as the basic data type of C language, constructed data types, algorithm design, flow chart design, syntax rules, the 3 kinds of basic programming structure (i.e. sequence, selection, cycle), design of function modules, etc. With the exercise of practical program development, students can master the basic skill of program design, and gather the elementary experience of program design. Attentions are paid to the training students' general abilities of applying computer for program development, including self-study ability, practice ability and ability of solving real programming problems. Meanwhile, attentions are paid to train the students with the good manner of program design and the spirit of group collaboration.

**Recommended Textbooks/References:**

1. TAN Haoqiang, C program design (third Edition). Tsinghua University Press, 2005
2. TIAN Shuqing. Tutorial of ranking exam for band two (C language). Higher Education Press, 1998

**Course Number: 0009016**

**Course Title: Principles and Applications of Microcontroller**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Digital Fundamentals, Electronic Devices and Circuit Theory, C language programming

**Evaluation Method:** Written Exam

**Course Description:**

This course introduces the development process and the main application areas of the single-chip computer, and it is based on the series of Soc of C8051F which are close to the real SCM environments. The main contents include: complement, anti-code, the conversion of some different number system, binary addition, subtraction, multiplication and division methods, the basis of single-chip hardware, including the various hardware resources and working principle of the internal microcontroller, such as memory, I/O port, interrupt system, timers, serial port, the A/D and the D/A, etc., the design of software; MCS-51 instruction set, the 8051 assembly programming and C51 programming, the application system design of the MCU, the extension of the C8051F and the circuit design of I/O interface.

**Recommended Textbooks/References:**

1. ZHANG Junmo. SOC SCM Principles and Applications: Based on C8051F Series. Beijing University of Aeronautics and Astronautics Press, 2007
2. TONG Changfei. C8051F MCU Development and C Programming Language. Beijing University of Aeronautics and Astronautics Press, 2005
3. Pan Zhuojin,SHI Guojun. C8051Fxxx high-speed SOC SCM Principles and Application. Beijing University of Aeronautics and Astronautics Press, 2002
4. PAN Zhuojin,SUN Delong, XIA Xiufeng. C8051F MCU Application of Analytical. Beijing University of Aeronautics and Astronautics Press, 2002

**Course Number: 0009047**

**Course Title: Digital Signal Processing II**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Bioengineering

**Prerequisites:** Engineering Mathematics (complex function), Signals and Systems

**Evaluation Method:** Written Exam

**Course Description:**

Digital signal processing is to use computer to gather, transform, estimation and identify the signal by using numerical method to derive information. This course focuses on basic concepts and theories of the DSP, including the discrete time domain signal and the discrete systems of the time domain, the frequency domain analysis of time-domain discrete signals and systems, the Discrete Fourier Transform (DFT), Discrete Fourier Transform (FFT), the basic network structure and the analysis of discrete systems with time-domain, the design of IIR and FIR filters. Strengthening practice through experiments to make the students can solve actual problems by using DSP method.

**Recommended Textbooks/References:**

1. Hu GuangShu. Introduction to Digital Signal Processing. Tsinghua University Press, 2006
2. Oppenheim A.V, Liu ShuTang. Discrete-time signal processing (Second Edition). Xi'an Transportation University Press, 2001
3. Sanjit K.Mitra. Digital Signal Processing – A Computer-Based Approach (Second Edition). McGraw-Hill, 2001
4. Ding YuMei, et al. Digital Signal Processing. Xi'an University of Electronic Science and Technology Press, 1999
5. Yao TianRen, et al. Digital Signal Processing. Huazhong University of Science and Technology Press, 2000
6. Cheng PeiQing, et al. Digital Signal Processing. Tsinghua University Press, 2001
7. Liu YiCheng, Sun XiangE. Digital Signal Processing. Electronics Industry Press, 2004

**Course Number: 0007665**

**Course Title: Biomedical Measurement and Sensors**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedicine Engineering

**Prerequisites:** Electronic Technology; Circuit Analysis; Human Anatomy and Physiology

**Evaluation Method:** Written Exam

**Course Description:**

Two parts are included in the course. The structure of biomedical instrumentation, characteristics and measurement of physiological parameters are taught in the first part. In the second part, basics of sensors, measurement techniques and the applications in biomedicine are introduced. The students are expected to understand the basic concepts, theories, methods, and techniques. The basic topics include the meanings, measurement principles, measurement techniques of blood pressure, arterial oxyhemoglobin saturation and cardiac output. Basic principles and practical applications of resistance strain sensors, piezoresistive sensors, capacitive sensor, piezoelectric sensors, thermoelectric sensors, fiber optic sensors and biosensors are lectured. The knowledge will help students to use proper sensors and design measurement circuits. Students can also

analyze physiological parameters. The course will also help students make good preparations for their future design and research in biomedicine instrument field.

**Recommended Textbooks/References:**

1. Yang Yuxing, Biomedical Sensors and Measurement Techniques. Beijing:Chemical Industry Press, 2005.9
2. Peng Chenglin. Biomedical Sensors Principle and Application (Third edition). Chongqing:Chongqing university press, 2011.12
3. Wang Ping, Liu Qingjun. Biomedical Sensors and Measurement (Third edition). Hangzhou:Zhejiang University Press, 2010.10
4. Wang Ping, Ye Xuesong. Modern Biomedical Sense Techniques. Hangzhou: Zhejiang University Press, 2003.3
5. Chen Anyu. Medicinal Sensors (Second edition). Beijing: Science Press, 2008

**Course Number: 0005623**

**Course Title: The Biomedical Electron and Devices**

**Credit: 2.5 Total Credit Hours: 40**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** General Physics, Electronic Technology

**Evaluation Method:** Written Exam

**Course Description:**

Through class teaching and discussion, students must master the common technology of biomedical electronics and the design methods for analysis of medical instruments. Teachers should help students to develop a development capability of medical instruments during the class. This course asks the students to grasp the basic theories, basic technology and basic methods. Concrete knowledge includes: the characteristics of biomedical signal and extraction methods, interference and noise in the extraction process of biomedical signals; the principle and design of bioelectric preamplifiers; the design of the isolated stage of bioelectric preamplifier and electroencephalogram amplifier; analog filter, nonlinear transformation, voltage comparator, analog memory, the integration and differential of signal, modulation and demodulation of signal and other new technologies of bioelectrical signal processing; the conditions of producing excitation by electrical stimulation and the theory of pacemaker and defibrillator; clinical monitoring technology and monitoring system; wardroom monitoring technology and dynamic monitoring technology.

**Recommended Textbooks/References:**

1. CAI Jianhua, ZHANG Weizhen. Biomedical Electronics. Beijing University Press, 1997.12
2. GAO Shangkai. Medical Imagining System. Tsinghua University Press, 2007.8
3. WANG Baohua. Biomedical Measurement and Medical Instrument. Higher Education Press, 2005

**Course Number: 0003639**

**Course Title: Biomedical Signal Processing**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Signal and System, Digital Signal Processing

**Evaluation Method:** Written Exam

**Course Description:**

This course is a basic course of biomedical engineering discipline and is the professional core courses. Biomedical signal processing technology is important to explore the mysteries of life. Through the studying of this course, students can understand and master the characteristics of various biomedical signals, medical signal data acquisition system and sampling parameters, medical signal power spectrum analysis, all kinds of digital filter (FIR, IIR, Integer coefficients and the adaptive filter) design method and its application in medical signal noise removal. Through experiment, students can master various signal processing technology and computer programming method.

**Recommended Textbooks/References:**

1. Willis J. Tompkins. Biomedical Digital Signal Processing. Prentice Hall, 1993
2. DC Reddy. Biomedical Signal Processing. TATA McGRAW, 2005
3. Ni Neng, Rao Dezhong, Xie Zhengxiang. Biomedical digital signal processing technology and application. SCIENCE PRESS, 2005
4. Rangaraj M. Rangayyan. Biomedical Signal Analysis. WILEY INTERSCIENCE, 2002
5. Metin Akay. Nonlinear Biomedical Signal Processing. AKAY IEEE PRESS, 2000
6. Eugene N. Bruce. Biomedical Signal Processing and Signal Modeling. WILEY INTERSCIENCE, 2001

**Course Number:** 0005626

**Course Title:** Medical Image Processing

**Credit:** 3 **Total Credit Hours:** 48

**Students:** Undergraduate students Major in Life science and bioengineering

**Prerequisites:** Anatomy and Physiology, Digital signal processing ,Computer Programming

**Evaluation Method:** Written Exam

**Course Description:**

Medical image processing is an essential technique for modern medical diagnose and treatment. Medical imaging technology refers to the research of the formation process of medical image, including imaging mechanism, imaging equipment, and analysis of imaging system. It mainly focuses on the analysis, recognition, and visualization of the obtained medical images, such as CT or MRI, for the purpose of visual need of human or remote medical practice and so on. Some basic theories and methods for medical image processing will be taught and discussed, including image enhancement, image registration and 3D visualization. Students will gain experience in writing their own image processing program, including Image reading and writing, image enhancement, Image transformation and image data compression, as well as employing MATLAB tool box for image processing.

**Recommended Textbooks/References:**

**Textbooks:**

Medical Image Processing (Self edited).2011

**Key References:**

1. LUO shuqian, ZHOU Guohong. Medical image processing and analysis. Beijing: Science press, 2003

2. ZHANG Lu, GU Deshun, CHEN Ying. Medical Image Processing. Shanghai: Shanghai Science and Technology Press,2002
3. JIA Yonghong , Medical Image Processing. Wuhan: Wuhan University Press,2003
4. RONG Guanao, Computer image processing, Beijing: Tsinghua University Press.2000
5. GAO Shangkai, Medical imaging systems, Beijing: Tsinghua University Press.1999
6. GUO Xingming, Medical imaging technology, Chongqing: Chongqing University Press,2005

**Course Number: 0007667**

**Course Title: Programming with Visual Basic**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical-engineering

**Prerequisites:** Basic Programming with Language C

**Evaluation Method:** Written Exam

**Course Description:**

The ability of programming should be cultivated for the students after this course. Based on the primary designing structure of sequence, selection and repetition, conception of object orientation in programming should be mastered. In addition, the use of form and common controls, development of normal projects with Visual Basic are the main contents of this course. At the same time, professional words in Visual Basic should be mastered. Comments using English were encouraged. The emphases of the contents include the three designing structures mentioned above; concepts of function; transfer of the parameters; effective domain and lifetime of the variables, functions; operation of file and menu; operation of the graphs.

**Recommended Textbooks/References:**

1. LUO Chaosheng. Tutorial of Programming with Visual Basic 6.0. People's Posts&Telecom Press, 2005.
2. Diane Zak. Programming with Visual Basic 6.0 (English revised version). Publishing House of Electronic Industry, 2006.
3. LUO Chaosheng. Experimental Tutorial of Programming with Visual Basic. Science Press, 2006.

**Course Number: 0006251**

**Course Title: Medical Chemistry I-1**

**Credits: 4 Total Credit Hours: 64**

**Students:** Biotechnology and Food Quality and Safety Specialities

**Prerequisites:** None

**Evaluation Method:** Examination

**Course Description:**

This course is a basic course for undergraduate in Life Science and Bioengineering College. The modern basic theory and basic knowledge of chemistry is taught. This course will not only lay a good foundation for subsequent biochemistry and other courses, but also develop the necessary quality education to students through the unique research methods, ways of thinking and philosophy of modern chemistry. Based on the fact that the thinking, methods and ability of the

chemistry have significant differences with the majority of non-chemistry courses, making the undergraduate understand that there is a chemical world in their future technical fields and social lives, is undoubtedly not substituted by other disciplines in higher education systems. Combination of the knowledge penetrating in the practical problems of life, living and engineering with the basic theory of the chemical changes is like to build a bridge between the chemical and the social civilization, and it will make the undergraduate not only know the chemical world around them, but also expand their full range of potentials.

**Recommended Textbooks/References:**

1. Zuqi Wei, Basic Chemistry, People's Health Press, June 2008 version 7
2. Zuqi Wei, Basic Chemistry, People's Health Publishing House, August 2004, version 6
3. Wenwei You, Medical Chemistry, Chemical Industry Press, July 2002

**Course Number: 0004653**

**Course Title: General Biology**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biotechnology

**Prerequisites:** None

**Evaluation Method:** Exam

**Course Description:**

The students are expected to understand the basic knowledge, theories, methods, and techniques of biology, through which they will have the necessary foundation for future learning of the other biology courses. The basic topics include: The basic characteristic of life, biological macromolecules, the cell as the unity of life (structure the prokaryotic and eukaryotic cell, cell cycle, mitosis, meiosis, cell differentiation, cell death), taxonomy, animal morphology, plant morphology, heredity and variation, ecology, biological evolution.

**Recommended Textbooks/References:**

1. Wu Xiangyu, Chen Yuezeng General Biology, Higher Education Press, 2009.7
2. Hu Yujia, Modern biology, Higher Education Press, 1999.8
3. Lu Shiwan, Botany, Higher Education Press, 1992
4. Zhao Hanwen, Zoology, Liaoning Education Press, 1988.1

**Course Number: 0006252**

**Course Title: Medical Chemistry I-2**

**Credit: 4 Total Credit Hours: 64**

**Students:** Undergraduate students Major in Biological Technology and Food Quality and Safety

**Prerequisites:** Medical Chemistry I-1

**Evaluation Method:** Written Exam

**Course Description:**

On the basis of learning in "Medical chemistry I-1", the "Medical Chemistry I-2" is related to basic theory and method of medical organic chemistry. The organic molecular, associated with the medical, life science, food quality and safety, were introduced in structures and synthesis methods and applications. The functional groups in organic compounds are set as the main line, and the

basic concept, knowledge and theory are distributed in various chapters. From small molecules to macromolecular, the first is hydrocarbons, and oxygen containing organic compounds, finally introduces the materials of life—glucose, lipids, amino acid and protein compounds. The students are expected to master the molecular structures, chemical properties and some basic reaction principle of organic compounds.

**Recommended Textbooks/References:**

1. Zhang PuQing, Medical Organic Chemistry, Science Press, 2010
2. Gao Hongbin, Organic Chemistry, Higher Education Press, 2006
3. Xing Qiyi, Organic Chemistry, Higher Education Press, 2003

**Course Number: 0006281**

**Course Title: Medical Chemistry I-3**

**Credit: 4 Total Credit Hours: 64**

**Students:** Undergraduate students Major in Biological Technology and Food Quality and Safety

**Prerequisite:** Medical Chemistry -1, medicinal chemistry I-2

**Course Description:**

This course is one of the Life Science and Bioengineering College undergraduate basic courses which focus on chemical analysis section. “Analytical Chemistry” is a scientific discipline that develops and applies methods, instruments and strategies to obtain information on the composition and nature of matter in space and time. Biotechnology and other disciplines often utilize analytical chemistry to solve the research, production of a variety of specific issues.

Titrimetry, the course focus, supplemented by gravimetric analysis and photometric, and describes the separation and analysis of experimental data processing in analytical chemistry. Through the course of learning to enable students to firmly grasp the basic principles and measurement methods, to establish a clear concept of the “quantity” in the chemical. Students are expected to digest the various titration analysis method, the formation of the system to deal with and solve the basic problem of the variety of titrimetry; grasp the basic principles and applications of gravimetric analysis and photometric data processing and quality assurance in analytical chemistry; Learn the common separation and enrichment method. Students will have a comprehensive, systematic understanding of the basic theories, concepts and computation of the “Analytical Chemistry”, and understand and analyze the chemical new technology, new methods of application. Lay a solid foundation for related courses and research work.

**Recommended Textbooks/References:**

Teaching Material:

1. PAN Zhuojin, SUN Delong, XIA Xiufeng. C8051F MCU Application of Analytical. Beijing University of Aeronautics and Astronautics Press, 2002
2. Shide Huang, ShengwangLiang, Analytical Chemistry, Chinese Herbal Medicine publishing Press, 2005

**Reference Book:**

1. Analytical Chemistry (Fourth Edition), Wuhan University, Higher Education Press, 2000

**Course Number: 0007197**

**Course Title: Biochemistry -1**

**Credit: 3      Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biological Technology

**Prerequisites:** Analytical Chemistry, Organic Chemistry

**Evaluation Method:** Written Examination

**Course Description:**

Biochemistry is one of the compulsory courses for undergraduates majoring in biological science and technology. It expounds the chemical properties of life phenomenon, i.e., to describe the components, structure characteristics and functions of living organisms at the molecular level so as to reveal the essence of life. Biomacromolecules such as proteins, nucleic acids or polysaccharides that form living organisms are assembled with a certain pattern, namely, the respective units are arranged and connected in certain sequence to form polymers. Biochemistry-1 includes primarily biomacromolecules such as saccharines, lipids, proteins, and nucleic acids that form the living organisms and their respective unit structure, characteristics, and functions. These biomacromolecules complete life functions through chemical reactions. This course includes also the structure characteristics and functions of enzymes, vitamins, and hormones etc. that catalyze and regulate the chemical reactions in biological organisms.

**Recommended Textbooks/References:**

David L. Nelson, et al., Lehninger's Principles of Biochemistry, 4<sup>th</sup> Edition, W. H. Freeman, 2004

**Course Number: 0007196**

**Course Title: Biostatistics**

**Credit: 3      Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biotechnology & Food Quality and Safety

**Prerequisites:** Advanced Mathematics, Biology etc.

**Evaluation Method:** Exam

**Course Description:**

The course introduces the basic concepts of descriptive and inferential statistics, experimental design, and exploration of chronic and infectious disease epidemiology. The teaching process can be considered as a series process of the collection, processing, analysis of biology data, thus extracting novel conclusion from data; and from the analysis of the chanciness, found that the inevitability of things. During the process of teaching, the main point is the cultivation of student ability of the applied knowledge; introducing a variety of experimental designs and analysis method; training ability of the design and implementation of biological experiment. This course including: data collection and reorganization; theory distribution and sampling distribution; statistical hypothesis testing;  $\chi^2$  test; analysis of variance; regression and correlation; the methods of experimental design etc.

**Recommended Textbooks/References:**

1. LI Chunxi, JIANG Lila, SHAO Yun. Biostatistics (Fourth Edition). Science Press, 2008
2. SUN Zhenqiu. Medical Statistics (Third Edition). People Hygiene Press, 2010
3. CHEN Qinghu. Biostatistics. Higher Education Press, 2011
4. Betty Kirkwood, Jonathan Sterne. Essential Medical Statistics, Wiley-Blackwell, 2003

**Course Number: 0007198**

**Course Title: Physiology**

**Credits: 3 Total Credit Hours:48**

**Availability:** Available to undergraduates in Bioengineering and in Food quality & safety

**Pre-requisites:** Human Anatomy

**Evaluation Method:** Exam

**Course Description:**

The course of *Anatomy and Physiology* is to explain the human life's process and its living reality, so as to master the objective laws and relevant effect. By finishing the course, the student will have the ability to explain the relations between the forms and function, the parts and the whole, the organs and the environment, the balance and the unbalance, the healthy and the disease.

**Textbook and Key References:**

1. Physiology (7th edition), Zhu Danian (editor in chief), People's Hygiene Press, 2010
2. Human Anatomy Physiology (5th edition), Yue Limin, Cui Huixian (editors in chief), People's Hygiene Press, 2007
3. Physiology (5th edition), Yao Tai (editor in chief), People's Hygiene Press, 2001

**Course Number: 0004652**

**Course Title: Biochemistry -2**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biological Technology

**Prerequisites:** Analytical Chemistry, Organic Chemistry, Biochemistry -1

**Evaluation Method:** Written Examination

**Course Description:**

Biochemistry-2 is one of the compulsory courses for undergraduates majoring in the biological science and technology. One of the fundamental characteristics of life activities is that substances inside the living organisms are undergoing metabolism continuously following a certain rule, so as to realize the exchange of substance between the organism and its surrounding environment, automatically update itself and maintain a relative stable inner environment. The metabolisms for all substance are connected. Organisms have strict self-adjustment ability in order to form a unified body. Biochemistry-2 is to explore the synthetic and catabolism metabolic process of the macromolecules inside organisms, and the associated energy transformation. It is aimed to reveal in the molecular level that the essence of life has a high order and consistency. Topics of the course include primarily the chemical reaction mechanism, the key enzymes and their important adjustment functions for biological oxidation, glycometabolism, lipid metabolism, amino acid metabolism and nucleotide metabolism. Moreover, the important physiological significances of metabolisms and the diseases associated with metabolic disorders are discussed.

**Recommended Textbooks/References:**

David L. Nelson, et al., Lehninger's Principles of Biochemistry, 4<sup>th</sup>, W. H. Freeman, 2004.

**Course Number: 0005630**

**Course Title: Molecular Biology**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biological Technology

**Prerequisites:** Chemistry, Biochemistry

**Evaluation Method:** Written Exam, Assay, Oral presentation

**Course Description:**

Molecular biology is the branch of biology that deals with the molecular basis of biological activity. This field overlaps with other areas of biology and chemistry, particularly genetics and biochemistry.

The Objectives of this course is to present a detailed study of the structure and function of nucleic acids and mechanisms of gene expression as well as concepts recombinant DNA technology. Molecular biology deals with the molecular mechanisms of DNA replication, DNA repair, transcription, translation, and control of gene expression. We will also discuss cell cycle regulation, programmed cell death, molecular basis of cancer, and modern molecular biology techniques. Emphasis will be given to mammalian systems and molecular mechanisms of human diseases.

**Recommended Textbooks/References:**

1. ZHU Yuxian et al., Modern Molecular Biology 3th, Beijing: Higher Education Press. 2007
2. D. L. Nelson, et al., Lehninger's Principles of Biochemistry 4th, New York: W.H. Freeman, 2008

**Course Number: 0004657**

**Course Title: Microbiology**

**Credits: 3 Total Credit Hours: 48**

**Availability:** Available to undergraduates in Bioengineering and in Food quality & safety

**Pre-requisites:** Anatomy and physiology

**Evaluation Method:** Exam

**Course Description:**

The course of Microbiology is to explain the essential laws of the microbe in human life's process, so as to master the microbe's characteristics, structures, nutrition, reproduce, metabolism, hereditary variation, ecological environment, infection and immunity, classification and identification.

**Recommended Textbooks/References:**

1. Physiology (7th edition), Zhu Danian (editor in chief), People's Hygiene Press, 2010
2. Human Anatomy Physiology (5th edition), Yue Limin, Cui Huixian (editors in chief), People's Hygiene Press, 2007
3. Physiology (5th edition), Yao Tai (editor in chief), People's Hygiene Press, 2001

**Course Number: 0004656**

**Course Title: Cell biology**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Life Science

**Prerequisites:** General Biology; microbiology, biochemistry

**Evaluation Method:** Written Exam

**Course Description:**

Cell biology is a basic and leading scientific area of core biological courses. Cell biology reflects the great and distinguished advances of life science in recent century. It is clear that most of Nobelists won their Nobel Prize because of their great contribution to the development of cell biology or other areas closely associated with cell biology. Major topics include the molecules and structures that comprise prokaryotic and eukaryotic cells. The basic topics include: Cellular Biology and Cells; The Technologies Used in Cellular Biology; Cell Engineering Technologies; Membrane; Extracellular Matrix and Organelles; Mitochondrion and Chloroplast; Cell Communication; Nucleus and Chromosome; Cell Proliferation and Regulation; Cell Differentiation and Regulation; Apoptosis and Ageing; Tumor Cells and Gene Therapy of Tumors. Cell biology is the core course for the students who are trained in life science. Students are expected to understand the basic concepts, theories, methods, and techniques of cell biology and the related problem solving methods.

**Recommended Textbooks/References:**

1. Zhonghe Zhai, Xizhong Wang and Mingxiao Ding. Cell Biology, Third Edition, 2007. Higher Education Press.
2. Stephen R. Bolsover, et al. Cell Biology. Second Edition. 2003. A John Wiley & Sons, Inc., Publication.
3. Lodish et al. Molecular Cell Biology. 6th edition. 2007. W. H. Freeman.
4. Gerald Karp. Cell and Molecular Biology. First Edition. 2007. John Wiley & Sons Inc.

**Course Number: 0006255**

**Course Title: Genetics**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biotechnology

**Prerequisites:** General biology, Microbiology, Statistics and so on.

**Evaluation Method:** Written Exam

**Course Description:**

Genetics is that branch of biological science concerned with inheritance and variation. The field of genetics is one of the most rapidly growing fields in biology and life science. To study the course is beginning from the basic genetic phenomenon and then to the theoretical cellular and molecular principles. The main lines of this course are the genetic variability and stability, gene structures and functions, and genetic transmission. The basic topics include the three classic laws of heredity, the cellular and molecular mechanisms of inheritance, the nuclear inheritance and extra nuclear inheritance, the theoretical analysis of prokaryote and eukaryote inheritance, genetic analysis methods and characteristics of the qualitative characters and quantitative characters, and so on. One of the important targets is to make the students to have a complete and in-depth comprehension about the history of genetics developments, the transmission of genetic information, gene mutation, expression and regulation in different levels, including population level, individual level, cellular and molecular level. The new growing knowledge about genetical researching methods and progresses have been updated timely in classes.

**Recommended Textbooks/References:**

1. DAI Zhuohua, WANG Yafu, LI Jiwen, Genetics (2nd edition), Higher Education Press, 2008.
2. LIU Zudong, Genetics, (2nd edition), Higher Education Press, 1990.

**Course Number: 0007207**

**Course Title: Introduction to Bioengineering**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biotechnology

**Prerequisites:** Biochemistry

**Evaluation Method:** Written Exam

**Course Description:**

Modern bioengineering technology, seen as a high-technology by countries around the world, is an area of multidisciplinary science, involving genetic engineering, cell engineering, fermentation engineering, enzyme engineering, and application of these technologies and security impact. The course can provide some basic and relevant information on the basic principles and knowledge of bioengineering techniques, present research, development direction, and effects on the field of social engineering. The course aims to make the undergraduates understand modern bioengineering technology system, especially research background, current status and development prospects of genetic engineering, and create strong interest in solving the focus and hot issues human faces by employing modern biotechnology techniques, then inspire students with learning and creative awareness, thus enhance the students' comprehensive quality.

**Recommended Textbooks/References:**

1. Liao Xiangping. Introduction to bioengineering. Science Press, 2009
2. William J. Thieman, Michael A. Palladino. Introduction to Biotechnology (2nd Edition), Science Press, 2011

**Course Number: 0007158**

**Course Title: Freshmen Seminar Course— Introduction to Food Science**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:**

**Evaluation Method:** Open Exam

**Course Description:**

This course belongs to the food quality and safety freshman seminar class. It introduces the research on the food science including food science and food development, chemical composition and nutrition, food and health, food engineering, food hygiene and safety, food additives, food science, food standards and regulations. The students are expected to master the basic contents and the developments of the food science and technology. Combined with the characteristics of freshmen, we will discuss how to adapt to the University learning and establish learning method.

**Recommended Textbooks/References:**

1. Zhang Youlin, Introduction to Food Science, Science Press,2006.8
2. Lu Rongrong, Zhang Wenbin, Xia Shuqin, Introduction to Food Science, Chemical Industry Press, 2008.9

**Course Number: 0007216**

**Course Title: Instrumental Analysis**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Food Quality and Safety, and in Biotechnology

**Prerequisites:** Analytical chemistry, Organic chemistry

**Evaluation Method:** Written Exam

**Course Description:**

Instrumental analysis is a field of analytical chemistry that investigates analytes using scientific instruments. The contents of instrumental analysis include Spectroscopy, Mass spectrometry, Crystallography, Electrochemical analysis, Thermal analysis, Separation and Hybrid techniques. Spectroscopy measures the interaction of the molecules with electromagnetic radiation. Spectroscopy consists of many different applications such as atomic absorption spectroscopy, atomic emission spectroscopy, ultraviolet-visible spectroscopy, x-ray fluorescence spectroscopy, infrared spectroscopy, Raman spectroscopy, nuclear magnetic resonance spectroscopy, photoemission spectroscopy and so on. Mass spectrometry measures mass-to-charge ratio of molecules using electric and magnetic fields. There are several ionization methods: electron ionization, chemical ionization, electrospray, fast atom bombardment, matrix-assisted laser desorption/ionization, and others. Also, mass spectrometry is categorized by approaches of mass analyzers: magnetic-sector, quadrupole mass analyzer, quadrupole ion trap, time-of-flight, Fourier transform ion cyclotron resonance and so on.

**Recommended Textbooks/References:**

1. ZHU Minghua, Instrumental Analysis, 4th edition, Higher Education Press, June 2008.
2. Douglas A. Skoog, James F. Holler, Stanley R. Crouch. Principles of Instrumental Analysis. Brooks Cole; 6 edition (December 6, 2006)
3. Francis Rouessac, Annick Rouessac. Chemical Analysis: Modern Instrumentation Methods and Techniques. Wiley; 2 edition (May 15, 2007)

**Course Number: 0006886**

**Course Title: Food Analysis**

**Credit: 4 Total Credit Hours: 64**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:** Organic Chemistry, Analytical Chemistry, Instrumental Analysis

**Evaluation Method:** Written Exam

**Course Description:**

Food analysis is a subject that studies detection methods of food components in various types of food and related theory, and then assesses the quality of food. Food analysis plays an important role in the evaluation of the nutritional value of food, quality control of fresh and processed foods, monitoring and evaluation of food additives and other toxic pollutants."Food Analysis" course is a basic required course in food quality and safety of the undergraduate, Mainly related to various analytical methods of food nutrients, toxic and hazardous substances, food additives, Focuses on the national standard methods for protein, fat, carbohydrates, water, acidity, vitamins, mineral elements in foods and food additives, limited elements, pesticide residues and aflatoxin. Sensory analysis methods and physical test methods and sampling, preservation and pretreatment methods are included. This course enables students to grasp the basic principles and measurement

techniques.

**Recommended Textbooks/References:**

1. Wang YongHua, Food Analysis(2nd Edition). China Light Industry Press .2010.
2. Xie BiJun, He Hui. Food Analysis. Science Press. 2009.
3. Li QiLong, Hu JingBo. Food Analytical Science. Chemical Industry Press. 2011
4. S.Suzanne Nielsen, Yang YanYi translate. Food Analysis (2nd Edition). China Light Industry Press. 2002

**Course Number: 0007217**

**Course Title: Food Nutrition and Hygiene**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:** Food science outline, microbiology, biochemistry

**Evaluation Method:** exam

**Course Description:**

This course contains two parts: Food nutrition and hygiene, which are different and closely connected. The object of Food nutrition is study on the nutrient and bioactivator's function and influence on people's health and physiology. The hygiene is focus on harmful factors in food and the preventive measures. The course will train the students understanding the basic concepts of food nutrition and hygiene, mastering the methods used to calculate the intake of nutrient, learning to arrange the healthy dietary. The students have to learn to apply their knowledge to analyze and solve practical problems encountered, so that they have a good foundation to be qualified their job independently in future.

This course mainly content: the human body's needs on nutrition, which is the basic of nutrition, the nutrition value of all kinds of food, different groups' demand of nutrition, nutrition and disease, food contamination and prevention, food poisoning and prevention, food supervision and management, etc.

**Recommended Textbooks/References:**

1. Ren SC. Food Nutrition and Hygiene. China Light Industry Press, 2011
2. Gao YP, Yuan JY. Food Nutrition and Hygiene. Maritime Press, 2010
3. Li X, Chen MY. Food Nutrition and Hygiene. Tourism Education Press. 2010
4. Chinese Nutrition Society. The Dietary Guidelines for Chinese Residents. The Tibetan people's Press.2010
5. YU K. Nutrition and Health. Fudan University Press. 2011

**Course Number: 0007218**

**Course Title: Food Quality Management**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:** Food analysis

**Evaluation Method:** Exam

**Course Description:**

Food is the special product related to human health and life safety. The food quality evaluation, food quality control and food safety management attracts much concerns and attentions. The main topics of the course include the basic concepts, theories and research methods of food quality managements, the related laws, standards, organizations, assurance systems and specifications of food safety management, the food safety support systems of ISO 9000, ISO14000, ISO22000, Good Agricultural Practice (GMP), Hazard Analysis Critical Control Point (HACCP), and so on. The progresses and hot spots concerning about food quality and safety management have been updated timely in the classes. The main important targets are to make the students to completely understand the basic knowledge, related laws and standards of the food quality control, to know the new theories, new methods and developments of food safety management, to comprehend the basic theories and technologies of food chemical and biological analysis, and to adapt the increasing and more stringent social needs for guaranteeing the food safety, food quality inspection, control and evaluation.

**Recommended Textbooks/References:**

1. CHEN Zongdao, LIU Jinfu, CHEN Shaojun, Food quality control and food safety management (2nd Edition), China Agricultural University Press, 2011

**Course Number: 0006889**

**Course Title: Foodsafetiology**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in food Quality and Food Safety

**Prerequisites:** Microbiology, biochemistry, analytical chemistry, immunology

**Evaluation Method:** Peacetime grades + Written Exam

**Course Description:**

The basic concepts of food safety management methods and detection techniques are introduced in this course. The students are expected to master the theories of food safety, understanding the potential hazards in food, domestic food hygiene and food safety supervision systems, understanding food safety issues, safety evaluation, and analysis techniques, quality management and quality control in food production. The basic topics include: concepts of food safety management system; the definition and types of plants and animals natural toxic substances; the main sources of biological contaminants and their harms to human health, mastering the commonly used detection techniques; the sources and hazards of pesticides and veterinary drug residues in food, and associated detection techniques; the purpose, principles and contents of the safety evaluation of genetically modified foods; the concept of HACCP, GMP and ISO9000, characteristics and fundamental principles of HACCP.

**Recommended Textbooks/References:**

1. Wei Yimin, Food Safety Introduction Science Press, 2009
2. Zhong Yaoguang, Foodsafetiology(second Edition) Chemical Industry Press, 2011
3. Neal H. Hooker, Elsa A. Murano, Interdisciplinary Food Safety Research FL. CRC Press,2001

**Course Number: 0006895**

**Course Title: Food Safety Control Technique**

**Credit: 2.5 Total Credit Hours: 40**

**Students:** Undergraduate students Major in Food Quality and Safety, Food Science and Engineering, Biotechnology, Bio-Engineering

**Prerequisites:** Biochemistry, food chemistry, food engineering principles, microbiology, modern food testing technology

**Evaluation Method:** Written Exam

**Course Description:**

The book comprehensively and systematically introduced the safety control technology during food processing, including the principles and methods of Good Manufacturing Practice system (GMP), Hazard Analysis and Critical Control Point (HACCP) system and the ISO9000 system. According to the sources of raw materials and processing methods, different aspects of food safety control technology used in the field such as chemical security (heavy metals, pesticide residues, veterinary drug residues, food additives, etc.), bio-security (bacteria, fungi, viruses, etc.) and physical security (such as irradiation), were elaborated in detail. This book also introduced some comprehensive experiments of food safety control, such as the preparation of sanitation standard operating procedures (SSOP) and records, cases of implementation and certification of GMP. This book is used for undergraduate teaching major in food quality and safety, and also for personnel reference in the field of food quality and safety management, food science and technology in teaching and research, food production and management.

**Recommended Textbooks/References:**

1. Xia Yanbin and Qian He, Safety control in food processing, Beijing: China Light Industry Press, 2007.
2. Wu Yongning, modern food safety science, Beijing: Chemical Industry Press, 2003.5.
3. Xu Mudan and Mao Gennian, food security analysis and detection, Beijing: Chemical Industry Press, 2003.6.
4. Liu Qian, Zhu Xinquan, biosafety, Beijing: Science Press, 2002.2.
5. Zhu Shouyi, biological safety and preventing pollution, Beijing: Chemical Industry Press, 2000.7

**Course Number: 0006891**

**Course Title: Food Toxicology**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:** Introduction to Food Science, Biochemistry, Food Microbiology

**Evaluation Method:** Written Exam

**Course Description:**

To ensure human health, food toxicology focuses not only on the analysis and toxic effects of bioactive substances as they occur in foods, but also on the identification and evaluation of food security and food safety. The students are expected to understand the relationships between the xenobiotics in food and human health, to grasp the basic concepts of food toxicology, and to master the new techniques in food toxicology. The basic topics include: the basic concepts; the principles of absorption, distribution, metabolism and elimination of xenobiotics in food; the

mechanism of toxic effects; factors affecting the toxicity; the characteristics of general toxicity, mutagenesis, carcinogenesis, developmental toxicity and teratogenesis caused by xenobiotics in food; the methods in toxicity evaluation; the principles, regulations and procedures of risk assessment in evaluating food safety.

**Recommended Textbooks/References:**

1. YAN Weixing, DING Xiaowen. Food Toxicology. China Agricultural University Press, 2009
2. LI Jianke. Food Toxicology. China Metrology Press, 2011
3. WANG Xiangdong. Food Toxicology. Southeast University Press, 2007
4. Phillip L. Williams, Robert C. James, Stephen M. Roberts. Principles of Toxicology (2nd Edition). John Wiley & Sons, 2000
5. Ernest Hodgson. A Textbook of Modern Toxicology. (3rd Edition). John Wiley & Sons, 2004

**Course Number: 0007162**

**Course Title: Medical Information Retrieval**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** College English, Computer Basis

**Evaluation Method:** Report

**Course Description:**

Commonly used professional databases are introduced in this course to train students to obtain and utilize information and track the advanced research in Biomedical Engineering. The basic topics include: the basic knowledge and methods in information retrieval, Chinese full text database, PubMed retrieval system, ProQuest Biology Journals, Web of Science, Engineering Index and Patent database. Students learn how to find target literature rapidly and accurately with different approaches such as medical subject headings and subheadings, and with limits as well. Bilingual teaching, lectures and retrieval practice with computer are combined to expand the students' professional vocabulary, improve their ability to understand and analyze English literature in Biomedical Engineering. Students are required to submit reviews based on their search results.

**Recommended Textbooks/References:**

1. DONG Jiancheng. Medical Information Retrieval Course (second Edition). Southeast University Press. 2009
2. WANG Xiuping. Biomedical Information Retrieval. Science and Technology Literature Press. 2004
3. Baeza-Yates Ricardo. Modern Information Retrieval. China Machine Press. 2011
4. William R. Hersh, Information Retrieval: A Health and Biomedical Perspective, Springer-Verlag NY / Health Informatics. 2003

**Course Number: 0003346**

**Course Title: Introduction of Life Science**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students

**Prerequisites:** None

**Evaluation Method:** Exam

**Course Description:**

The content of this course covered the basic knowledge of bio-related areas. The students are expected to understand various areas of life sciences comprehensively and systematically simultaneously understand the forefront of the life sciences, through which they will have a solid theoretical foundation for subsequent courses learning. The basic topics include: chemistry of life. the cell as the unity of life (structure the prokaryotic and eukaryotic cell, cell cycle, mitosis, meiosis, cell death), taxonomy, ecology. Additionally, reproduction and genetics, cellular signaling and communication are included. Finally, brief introduction of modern biotechnological methods and its significant impact on human life are introduced.

**Recommended Textbooks/References:**

1. School of life sciences preparation of group of Peking University, Introduction of Life Science, Higher Education Press, 2000.7
2. Wu Qingyu, Basic Life Science, Higher Education Press, 2002.5
3. Shou Tiande, Introduction to Modern Biology, China Science and Technology University Press, 1998.4
4. Zhou Hong, Human Ecology, Higher Education Press, 2001.7

**Course Number: 0006160**

**Course Title: Network Technology and Telemedicine**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Fundamentals of Computer

**Evaluation Method:** Written Exam

**Course Description:**

The main content of the course include basic knowledge of computer network and network application in medicine; the basic knowledge of data; network architecture concept, network architecture model: local area network system structure and the technical features of various local area network; network equipment; and from the point of introduction of LAN Hospital Information System and Picture Archiving and Communication Systems; from the internet introduces Telemedicine. This course belongs to the professional course, the purpose is to make students master various information exchange network, and on the basis of study of Hospital Information System and Telemedicine. Students can choose the proper communication network, and grasp the basic system module and its function. Combined with the knowledge of programming in software development, they can design the related medical system.

**Recommended Textbooks/References:**

1. FENG Boqin, CHEN Wenge. Computer Networks (second edition). Higher Education Press, 2008
2. CAO Ronggui. Hospital Management Information Management Section. People's Medical Publishing House, 2003
3. FU Zheng. Telemedicine. People's Military Medical Press, 2005

**Course Number: 0007190**

**Course Title: Medical Biophysics**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Introduction of Life Science, University Physics

**Evaluation Method:** Written Exam

**Course Description:**

Medical Biophysics is a cross discipline that uses the basic theories, methods and technologies of physical science to study physical properties of living matter, physical and physical-chemical principles of life activities, as well as the effects of physical factors on biology systems. This course can help students understand the physical phenomena and laws of life activities from the physical point of view, and then make better use of modern physical and engineering technologies to design and develop new medical equipments. The course includes three chapters: electro-biology, bio-magnetism, and ultrasonic medical principle. The detailed contents cover the following areas: physical characteristics at different levels of organism, the effects of physical factors on the organism, the roles of the physical properties to ensure the organism normal physiological functions, the relationships between diseases and the changes in physical properties, as well as the applications of physical techniques and equipments in diagnosing and treating diseases.

**Recommended Textbooks/References:**

1. LIN Kechun, WU Benjie. Medical Biophysics. Peking University Medical Press, 2008
2. QIU Guanmei, PENG Yinxiang. Biophysics. Wuhan University Press, 2003
3. HU Xinmin. Medical physics learning guide. People Sanitation Press, 2002
4. YANG Wenxiu, LI Zhengming. Generality in Biomedical physics. Tianjin Science and Technology Translation & Publishing Co, 1993

**Course Number: 0007191**

**Course Title: Modern Medical Equipment**

**Credit: 2 Total Credit Hours: 32**

**Students:** Biomedical Engineering Undergraduates

**Prerequisites:** Digital Electronic Technology, Analog Electronic Technology, University Physics, Foundation of C Language Programming, Anatomy and Physiology, Biomedical Measurement and Sensors, Principles and Applications of Microcontroller, Medical Image Processing, Biomedical Signal Processing, Biomedical Electron and Devices.

**Evaluation Method:** Design of two typical instrumentations

**Course Description:**

This course is a discipline foundation required course for biomedical engineering which focuses on translating the discipline basic knowledge into the biomedical engineering ability. Based on digital electronic technology and analog electronic technology, it integrates university physics, electronics, foundation of C language programming, anatomy and physiology, biomedical measurement and sensors, principles and applications of microcontroller, medical image processing, biomedical signal processing, biomedical electron and devices with biology and medicine to design of a real time PCR instrumentation and a ECG monitor based on PC. The design of two typical instrumentations will consolidate the foundational knowledge of biomedical engineering, improve the ability to analyses and resolve problems, train the practical capability for

the students.

**Recommended Textbooks/References:**

1. LIN Jiarui. Design of Microcomputer-Based Medical Instrumentation. Huazhong University of Science & Technology Press 2004.
2. LI Jinming. Real time PCR technology. People's Military Medical Press, 2007
3. Deng Qinkai. Principle of modern medical instrumentation design. Science Press 2004.
4. John G. Webster, Bioinstrumentation. WILEY, 2004

**Course Number: 0006161**

**Course Title: MATLAB & Its Application in Biomedical Engineering**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Discrete Mathematics (Set and Graph Theory, Algebra and Logic)

**Evaluation Method:** Investigate

**Course Description:**

The MATLAB programming language is a simple, efficient, highly functional and high-level language. In the field of scientific and engineering computing, it has the incomparable advantage compared with other programming languages. It integrates numerical analysis, matrix computation, scientific data visualization, as well as nonlinear dynamic system modeling and simulation, and many other powerful features in an easy to use windows environment, and provides a comprehensive solution for scientific research, engineering design and effective numerical calculation in many fields of science. In this course, the students will go through the assigned textbooks in English and a number of medical image processing and medical signal processing tasks to improve English reading ability as well as the ability of using MATLAB tools to solve practical issues under the guidance of the tutor. This course focuses on students' self-learning ability, practical ability, the capabilities of solving the practical problems of biomedical application, and it will train students' spirit of teamwork as well.

**Recommended Textbooks/References:**

1. The Mathworks Inc , Learning Matlab
2. The Mathworks Inc, Signal Processing Toolbox
3. Rafael C. Gonzalez, Richard E. Woods, Stevenl. Eddins. Digital Image Processing Using MATLAB, Publishing House of Electronics Industry, 2009
4. Chen G,Zhang M,Xue H,The application of matlab programming language on signal processing and image processing, Beijing, Science Press, 2000

**Course Number: 0003441**

**Course Title: Introduction to Basic Medicine**

**Credits: 2 Academic hours: 32**

**Availability:** Students in Medical Bioengineering

**Pre-requisites:** Physiological Anatomy

**Evaluation Method:** Check

**Course Description:**

The course of Introduction to Basic Medicine is consists of three parts, they are Medical Science, Doctor, and Disease. The course includes the following: Medical History, Medical Ethics, Social Medicine, Medical Management, Medical Education, and Diagnosis.

**Recommended Textbooks/References:**

1. Physiology (7th edition), Zhu Danian (editor in chief), People's Hygiene Press, 2010
2. Physiological Anatomy (5th edition), Yue Limin & Cui Huixian (editors in chief), People's Hygiene Press, 2007
3. Physiology (5th edition), Yao Tai (editor in chief), People's Hygiene Press, 2001

**Course Number: 0007192**

**Course Title: Object-Oriented Programming Design C++**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** C Language Programming

**Evaluation Method:** Comprehensive course design

**Course Description:**

“Object-Oriented Programming Design C++” is a compulsory course for undergraduate students major in computer and also a basic engineering course for science and engineering college students, and its application is very extensive. “Object-Oriented Programming Design C++” is an elective course in our specialty, and the main task of the course is to enable students to master the C++ console application design, and windows application design based on the windows API and MFC class library. The ultimate aim is to train students to master the basic software application techniques, and lay a solid foundation for students engaged in software development occupations and researches in future. In the teaching process, it is the most important to cultivate programming ideas.

**Recommended Textbooks/References:**

1. HAO Apeng, HAN jie, etc. The new century C programming training course (second Edition). Publishing house of electronics industry, 2002
2. HUANG Weitong. Object-oriented and visual C++ programming design (second Edition). Tsinghua University Press, 2003

**Course Number: 0007193**

**Course Title: Medical Device Production and Operation Legislation**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Medical Information Retrieval, Introduction of Life Science, Awareness Training, Probability Theory and Mathematical Statistics

**Evaluation Method:** Written Exam

**Course Description:**

This course is one of the basic and elective courses of biomedical engineering undergraduate students. The purpose of this course is to learn practical application on the production and management of medical device. Based on the safety of ensuring the quality of medical devices, the

main line of the course is the introduction of the most commonly encountered foundation work. Then, we will sum up the law of the Medical Device Administration, and focus on the introduction of the standards, registration, safety requirements and environmental control of medical devices as well as Medical Device Quality Management System. In a word, from this course, students would have a good comprehension of current Chinese medical device regulatory system and important regulations, be familiar with the production of medical devices, and have a systematic understanding of the establishment and improvement process of the quality management system. This course will help students form a concept of accordance with the law practitioners, and prepare for future study and work.

**Recommended Textbooks/References:**

1. HUANG Jiahua. Medical Device Registration and Management. Science Press, 2008
2. ZHANG Shuxiu. Medical Device Registration Manual. China Medical Science and Technology Press, 2007

**Course Number: 0007194**

**Course Title: Medical Biomechanics**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Advanced Mathematics; Engineering Mechanics; Anatomical physiology

**Evaluation Method:** Written Exam

**Course Description:**

This course is an elective subject course for undergraduate students majored in biomedical engineering. Biomechanics is an important component part of Biomedical Engineering. The methods of mechanics and biology are combined together to solve the mechanical problems in medicine, physiology and biomedical engineering. It has great significance in the prevention, diagnosis and treatment of human diseases. This course aims to study the research method and features of macro biomechanics, and explain how to propose and solve problems in biomechanics by some successful examples. The main contents of this course include: fundamental of continuum mechanics, tissue biomechanics and biofluid mechanics. Emphases are studying the deformation theory, stress theory and constitutive theory of continuum; analyzing the viscoelastic mechanical property of soft tissue and the basic theory of hemodynamics; investigating some special topics oriented to medical application. The students are required to grasp the mechanical theories and approaches to analyze and solve the problems about the movement, force and mechanical properties of living organism.

**Recommended Textbooks/References:**

1. Tao Z.L. Introduction to Biomechanics. Tianjin Science & Technology Translation & Publishing Co., 2000.
2. Fung Y. C. Biomechanics. Hunan Science & Technology Press. 1986
3. Fung Y. C. Biomechanics -Circulation (Second Edition), Springer, 1997

**Course Number: 0004668**

**Course Title: Bioinformatics**

**Credit: 2.0 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Advanced Mathematics, University Physics, Introduction of Life Science

**Evaluation Method:** Written Exam

**Course Description:**

Bioinformatics is a cross-discipline that applies the theories, methods and technologies of informatics science to gather, store, analyze and integrate biological and genetic information, helping researchers obtain deeper biological knowledge, better understand biology world, and then apply the knowledge in gene-based and protein-based drug discovery and development. The course is helpful for students to build the relative knowledge system, to learn the basic methods of bioinformatics, and apply the often used methods to analyze biological problems. The course includes five chapters. The detailed contents are the following: introduction, sequence analysis, homology modeling in biology and medicine, protein-ligand docking in drug design, structure optimization and molecular dynamics simulation. The involved molecular modeling software packages are BLAST, AutoDock, VMD and Gromacs.

**Recommended Textbooks/References:**

1. Thomas Lengauer. Bioinformatics—from genome to drug. Chemical Industry Press. 2006
2. P. E. Bourne, H. Weissig. Structural Bioinformatics. Chemical Industry Press. 2009
3. XU Xiaojie, HOU Tingjun, QIAO Xuebin, ZHANG Wei. Computer-aided drug design. Chemical Industry Press. 2004

**Course Number: 0007195**

**Course Title: Biomedical Statistics**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biomedical Engineering

**Prerequisites:** Advanced Mathematics, Probability Theory and Mathematical Statistics

**Evaluation Method:** Exam

**Course Description:**

Statistics is the study of the collection, organization, analysis, and interpretation of data. Biomedical statistics is that using principles and methods of statistics, combined with the actual biology and medical, research data collection, analysis and inference. The course introduces the basic concepts of descriptive and inferential statistics, experimental design, and exploration of chronic and infectious disease epidemiology and how to use a statistical package. After completing this course, students will know: (1) the definition and use terminology; (2) The choice of reasonable statistical methods and program; (3) to understand the advantages and limitations of biomedical statistics by case analysis; (4) to operate the statistical SPSS (Statistical Product and Service Solutions) package.

**Recommended Textbooks/References:**

1. LI Chunxi, JIANG Lila, SHAO Yun. Biostatistics (Fourth Edition). Science Press, 2008
2. SUN Zhenqiu. Medical Statistics (Third Edition). People Hygiene Press, 2010
3. CHEN Qinghu. Biostatistics. Higher Education Press, 2008
4. Betty Kirkwood, Jonathan Sterne. Essential Medical Statistics, Wiley-Blackwell, 2003

**Course Number: 0006262**

**Course Title: SPSS and Its Application to Medicine**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biotechnology & Food Quality and Safety

**Prerequisites:** Advanced Mathematics, Biology etc.

**Evaluation Method:** Exam

**Course Description:**

SPSS (Statistical Package for the Social Sciences) software widely uses in the biology, the medical service, the marketing research, the scientific research, education and so on. It not only contains the data edition, statistical charts, and a variety of single-variable descriptive statistical analysis and testing, but also a large number of classical multivariate statistical analyses. This course focuses on editing and reorganization of data, tables and charts, chi-square test and analysis of variance, linear correlation and regression. This course provides an overview of data mining and the fundamentals of using SPSS Modeler. The course structure follows the stages of a typical data mining project, from reading data, to data exploration, data transformation, modeling, and effective interpretation of results. The course provides training in the basics of how to read, explore, and manipulate data with SPSS Modeler, and then create and use successful models.

**Recommended Textbooks/References:**

1. CHEN Shengke. SPSS: From Basic to Familiarity. Tsinghua University Press, 2010
2. MA Binrong. SPSS 17.0 application to medicine statistics (Fourth Edition). Science Press, 2010
3. LI Hongcheng. SPSS 18 data analysis: foundation and practice Electronics Industry press, 2010

**Course Number: 0004660**

**Course Title: Introduction to Food Inspection**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biotechnology

**Prerequisites:** Organic Chemistry, Analytical Chemistry

**Evaluation Method:** Written Exam

**Course Description:**

Food inspection is a subject that studies detection methods of food components in various types of food and related theory, and then assess the quality of food. Food inspection plays an important role in the evaluation of the nutritional value of food, quality control of fresh and processed foods, monitoring and evaluation of food additives and other toxic pollutants.” Introduction to Food Inspection “ course is a professional limited elective in biotechnology undergraduate, Mainly related to various analytical test methods of food nutrients, toxic and hazardous substances, food additives, Focuses on the national standard methods for protein, fat, carbohydrates, water, acidity, vitamins, mineral elements in foods and food additives, limited elements , pesticide residues and aflatoxin. Including sensory inspection methods and physical test methods and sampling, preservation and pretreatment methods. Through this course to enable students to grasp the basic principles and measurement techniques of the commonly used methods in food inspection.

**Recommended Textbooks/References:**

1. Zhang YinLiang. Food Inspection Tutorial. Chemical Industry Press. 2006
2. Wang YongHua, Food Analysis(2nd Edition). China Light Industry Press .2010.
3. Xie BiJun, He Hui. Food Analysis. Science Press. 2009.
4. S.Suzanne Nielsen, Yang YanYi translate. Food Analysis (2nd Edition). China Light Industry Press. 2002

**Course Number: 0007208**

**Course Title: Scientific Writing and Communication**

**Credit: 1 Total Credit Hours: 16**

**Students:** Undergraduate students Major in Biotechnology and Food Quality and Safety

**Prerequisites:** None

**Evaluation Method:** Written Exam

**Course Description:**

Effective communication is generally considered as important to the scientific process as experimental research itself. “Scientific Writing and Communication” course covers the main facets of scientific communication and focuses on essential techniques for effective writing and presentation for scientific information. During the course, we will discuss sections of a scientific article, types of publication, assessment of publication quality, submission and publication process. Thesis writing will also be discussed as well as poster preparation, preparing and delivering an oral presentation clearly to a broad audience and proposal writing. By the end of the course, students should see improvement in their ability to produce clear, coherent and correct reports and presentations.

**Recommended Textbooks/References:**

**Textbook:**

1. How to write and publish a scientific paper(sixth edition)/Publishing House of Electronics Industry /Robert A. Day, Barbara Gastel/2006

**References:**

1. Ren Shengli. How to write and publish scientific papers in English. Science Press. 2011
2. Liang Fujun. Standard Writing and Editing of Academic Papers. Tsinghua University Press. 2010
3. Bjorn Gustavii. How to write and illustrate a scientific paper. Peking University Press. 2008
4. Barbara Gastel. How to write and Publish a Scientific Paper. Peking University Press. 2007
5. Jiang Wusheng, Gu Xiegang. Literature Retrieval and Academic Paper Writing. Higher Education Press. 2006

**Course Number: 0007209**

**Course Title: Drug Synthesis**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate student majoring in Biotechnology

**Prerequisites:** Organic Chemistry

**Evaluation Method:** Midterm and Final Examinations

**Course Description:**

On the basis of Organic Chemistry, the course deals with the basic reactions and methods used in the preparation of drugs by means of modern and scientific strategies, and it presents an equal importance in theory and practice. By focusing on the organic drugs, the course mainly studies: (1) the relationships between the reaction mechanisms, reaction substrates and reaction selectivities and products of the organic reactions utilized in drug synthesis; (2) the key affecting factors, reagent characteristics, application generalities, limitations, exploration of the basic rules, special properties and the relationships between various organic reactions. The course is taught by the bilingual education by means of multi-media, allowing students to learn drug synthesis effectively as the education cores. In the course of teaching drug synthesis, the knowledge of drug synthesis and English is provided simultaneously for students, and therefore the course is capable of being understood in English logically. The course is centered on the explanation and pronunciation of terminology and education content in English, affording students the ability to search for and read English literature fluently.

**Recommended Textbooks/References:**

1. Jie Jack Li, Douglas S. Johnson, Drago R. Sliskovic, Bruce D. Roth Contemporary Drug Synthesis, A JOHN WILEY & SONS, INC., Publication, 2004
2. Douglas S. Johnson, Jie Jack Li. The Art of Drug Synthesis, A JOHN WILEY & SONS, INC., Publication, 2007
3. Jiang F. C., Pharmaceutical Synthesis, Chemical Industry Press,2008
4. Wen R., Organic synthesis for drug synthesis, Chemical Industry Press,2010

**Course Number: 0007210**

**Course Title: Immunology**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in bio-technology

**Prerequisites:** Molecular Biology, Cellular Biology, Microbiology

**Evaluation Method:** Written Exam

**Course Description:**

Immunology is a branch of biomedical science that is composed of all aspects of the immune system, including physical structures and physiological functions of immune system, immune response and malfunctions of immune system in immunological disorders, immunodiagnosis and immune prevention. The theories and techniques of immunology have been broadly used in medical science domain. The course is bilingual and designed to provide a basic introduction about human immune system and to enable students to comprehend the basic theory of immune function and its regulation. This course covers topics such as innate and adaptive immune system, humoral and cellular responses and their regulations, autoimmune disease and allergy. After learning, students should be able to understand the functions of the immune system and translate their knowledge into practice. Students admitted to this course are expected to have basic background knowledge of microbiology, molecular biology or cell biology.

**Recommended Textbooks/References:**

1. GONG Feili. Medical Immunology. Science press. 2009
2. LV Shijing. Study Guide for Medical Immunology. Science press. 2009
3. Janeway CA. Immunobiology 6th. Garland publishing. 2005

**Course Number: 0004666**

**Course Title: Pharmacology**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biotechnology

**Prerequisites:** General Biology, Biochemistry, Cell Biology

**Evaluation Method:** Written Exams

**Course Description:**

Pharmacology is one of the main curricula of elementary medical science, and it is the transitive subject used for the communication of elementary medical science and clinical medicine. Students should master the interaction and action regulation between medicine and body. Meanwhile, they should also master the pharmacological action, mechanism, clinical application and adverse action of the drugs used commonly for clinical application, which may provide elementary theory and knowledge for clinical diagnosis and preventing disease. Furthermore, Pharmacology is also a practical subject, students not only should master the basic operational skills and theory by the experimental teaching, but also the designing thinking and procedure. Only so can students establish a satisfactory foundation for engaging in science researching in future.

**Recommended Textbooks/References:**

1. Yang Baofeng editor, pharmacology (Seventh Edition). People's Medical Publishing House, 2008 January.
2. Qiao Guofen editor, pharmacology study guide and exercises. People's Medical Publishing House, 2008 May.

**Course Number: 0007211**

**Course Title: Systems Biology**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biotechnology and Bioengineering

**Prerequisites:** Biochemistry, Molecular Biology, Cell biology, higher mathematics

**Evaluation Method:** Written Exam

**Course Description:**

Systems biology is the newly emerged interdisciplinary which studies the complex biological phenomena by systematic methods. The students are expected to understand the basic concepts, theories, methods, and techniques of systems biology and their applications in R&D of bio-pharmaceuticals, through which their actual problem solving abilities will be improved. The basic topics include: the concepts of systems biology; systems biology related omics, including genomics, transcriptomics, proteomics, glycomics, metabonomics, interactomics, phenomics; mathematical modeling and simulation, the definition of system model, Mathematical description of biochemical reaction networks, dynamics model based on mass action law, cell signaling modeling, system simulation softwares and related databases; sequence alignment and databases searching, common used algorithms and web services; evolution model and the construction of phylogenetic trees.

**Recommended Textbooks/References:**

1. ZHANG Zili, WANG Zhenying. Systems Biology. Science Press,2009
2. Fred C. Boogerd. Systems Biology Philosophical Foundations. Science Press,2008
3. Palsson B.O. Systems Biology: Properties of Reconstructed Networks, Cambridge University

Press, 2006.

4. McDerMott Jason etc. (Eds.) Computational Systems Biology (Springer Protocols: Methods in Molecular Biology), Humana Press, 2009.

**Course Number: 0007212**

**Course Title: Bioethics**

**Credit: 1 Total Credit Hours: 16**

**Students:** Undergraduate students Major in Biotechnology

**Prerequisites:** General Biology, Cell Biology, Biochemistry and Molecular Biology

**Evaluation Method:** Written Exam

**Course Description:**

Bioethics is the study of controversial ethics brought about by advances in biology and medicine, which is concerned with the ethical questions that arise in the relationships among life sciences, biotechnology, medicine, politics, law and philosophy. The students are expected to understand the basic concepts and theories in bioethics, to face the problems brought about by the high-tech development in life science, and to conduct scientific research in a rational manner. The basic topics include: the concepts of bioethics; ethical issues of gene detection and gene discrimination; ethical issues of gene pharmaceuticals and gene therapies; ethical issues of human cloning; ethical issues of test-tube babies, artificial insemination and surrogacy; ethical issues of embryonic stem cells; ethical debates over the birth control and abortion; ethical issues of organ donation and euthanasia; ethical issues of animal rights and human rights arise from *in vivo* experiments.

**Recommended Textbooks/References:**

1. GAO Chongming, ZHANG Aiqin. Bioethics on fifteen topics. Beijing University Press, 2004
2. GAO Chongming, ZHANG Aiqin. Bioethics. Beijing University Press, 1999
3. CHEN Yuanfang, QIU Renzong. Biomedical research ethics. Perking Union Medical College Press, 2003
4. David P. Clark and Nanette J. Pazdernik. Biotechnology: Applying the genetic revolution. China Science Press, 2009

**Course Number: 0007213**

**Course Title: Drug Quality Management**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students in biotechnology

**Prerequisites:** Pharmacology, drug synthesis, biochemistry and molecular biology

**Evaluation Method:** Written Exam

**Course Description:**

This course is a limited professional for biomedical engineering (biotechnology) undergraduate to choose. This course focuses on GLP, GCP, GMP, GSP and implementation of key points in the process of drug research, production and circulation, at the same time, combined with the development of drugs, a brief introduction of Chinese herbal medicine production quality management (GAP), the quality of medical institutions in preparation content management, biological products and quality management. Refer to the large number of industry examples,

theoretical, and regulations of the specific visualization, vivid, so that students fully understand importance of quality management in the process of drug research, production, and circulation.

**Recommended Textbooks/References:**

1. Wang xiaojie. The drug quality management (First Edition) Beijing: Chemical Industry Press,2008
2. ZHEN hanshen. The drug quality management (First Edition) Beijing: China Press of traditional Chinese medicine.

**Course Number: 0007214**

**Course Title: Introduction to Computational Chemistry**

**Credits: 2 Total Credit Hours: 32**

**Students:** Biotechnology and food quality and safety specialties

**Prerequisites:**

**Evaluation Method:** examination

**Course Description:**

This course is an interdisciplinary of computer science and chemistry. In recent years, with the rapid development of electronic technology and theoretical methods, computer dynamic simulation combined with quantum chemistry and molecular dynamics have been widely applied to biomedical and other fields, and have become a beneficial tool for development of numerous subjects.

This course will not only help the students to consolidate their existing chemical knowledge and also to have chance to apply their computer knowledge to solve the practical chemical problems. Students will know more about the computer applications in the disciplines of chemistry and biology students and will enhance their capacity of actually operating a computer through learning the Introduction to Computational Chemistry course. This course will also be good to expand their potentials for their future jobs. In addition, for the students who are interested in the field of scientific research, this course will lay a good foundation for their technical skills.

**Recommended Textbooks/References:**

1. Frank Jensen, John Wiley & Sons, Ltd. Introduction to Computational Chemistry, 1999.
2. Chunxiao Guo, Computational Chemistry, Industrial Press, August 2004
3. Guangxian Xu, Quantum Chemistry, Science Press, March 1987

**Course Number: 0007215**

**Course Title: Advanced Biotechnology**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Biotechnology, Food Quality and Safety

**Prerequisites:** Biochemistry and molecular biology

**Evaluation Method:** Written checking

**Course Description:**

Through the discussion of significant production practices and clinical applications of biological technology theory and economic fields, the basic concepts, theories, methods, and techniques of research methods and practical application of biological technology are passed on to student.

Specific instructions include: gene and genome, DNA recombination technology, protein engineering, enzyme engineering concept, enzyme production and purification, enzyme molecular modification, enzyme immobilization, enzyme water phase of the catalytic technology, such as the type of reactor that enzyme and design, enzyme engineering application in various production process, the microbes engineering, food biotechnology, agricultural biotechnology, the animal biotechnology, the DNA fingerprint and forensic identification, bioremediation, aquatic biotechnology, medical biological technology, gene therapy, molecular diagnostic technique, biological technology supervision and management, biological technology and ethics.

**Recommended Textbooks/References:**

1. William J. Thieman et al., Introduction to Biotechnology, Science Press, 2011.
2. The Bureau of Life Science and Biological Technology, Chinese Academy of Sciences, 2011 Industrial Biotechnology Development Report, Science Press, 2011.
3. Daniel Figey, Industrial Proteomics: Applications for Biotechnology and Pharmaceuticals, Wiley, 2005.

**Course Number: 0006258**

**Course Title: Chemistry of Traditional Chinese Medicine and Experimental Technology**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biological Technology

**Prerequisites:** Organic Chemistry, Analytical Chemistry

**Evaluation Method:** Written Exam

**Course Description:**

Chemistry of Traditional Chinese Medicine (TCM) and Experimental Technology is a subject which introduces the chemical constituents of TCM by modern technological methods with guidance of the theory of TCM. This course will introduce to students the study on effective chemical components in TCM, which possess biological activities and could be used to cure or prevent diseases. The students are expected to understand the research objects and mission of chemistry of TCM, master the structure type, physic-chemical properties, the basic theories, basic knowledge and basic skill about the extraction, isolation and identification methods of the active components in TCM; know well the spectrum characteristics of chemical constituents in TCM and the general principle and methods of structure identification of chemical ingredients in TCM; understand the relationship between effective components in TCM and resources development and new drug study, know well the general way looking for physiological activity constituents or effective ingredients in TCM. Through the study of this course, the students' capability of pursuing an occupation of research, development, production on TCM and related fields can be cultivated.

**Recommended Textbooks/References:**

1. KUANG Haixue. Chemistry of Traditional Chinese Medicine. China Publishing House of Traditional Chinese Medicine, 2008.
2. XIAO Chonghou. Chemistry of Traditional Chinese Medicine. Shanghai Scientific and Technical Publishers, 2006.
3. GAO Youheng. Chemistry of Traditional Chinese Medicine. Scientific Publishers, 2004.
4. GUO Li. Traditional Chinese Medicine Chemistry Experiment. Scientific Publishers, 2008.

**Course Number: 0004663**

**Course Title: Chemical Biology**

**Credit: 2.0 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Biological Technology

**Prerequisites:** Organic Chemistry, Biochemistry

**Evaluation Method:** Written Exam

**Course Description:**

Some forms of chemical biology attempt to answer biological questions by directly probing living systems at the chemical level. In contrast to research using biochemistry, genetics, or molecular biology, where mutagenesis can provide a new version of the organism or cell of interest, chemical biology studies sometime probe systems *in vitro* and *in vivo* with small molecules that have been designed for a specific purpose or identified on the basis of biochemical or cell-based screening.

Chemical biology is one of many interfacial sciences that are characteristic of a general trend away from older, reductionist fields toward those whose goals are to achieve a description of scientific holism. In this sense, it is related to other fields such as proteomics. Chemical biology has historical and philosophical roots in medicinal chemistry, supramolecular chemistry (particularly host-guest chemistry), bioorganic chemistry, pharmacology, genetics, biochemistry, and metabolic engineering.

**Recommended Textbooks/References:**

1. LIU Lei, CHEN Peng, ZHAO Jin, HE Chuan, Principles of Chemical Biology, Science Press, 2010
2. MA Lin, GU Lianquan, Introduction to Chemical Biology, Chemical Industry Press, 2006

**Course Number: 0006887**

**Course Title: Principle of Food Engineering**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:** Advanced Mathematics, Physical Chemistry

**Evaluation Method:** Written Exam

**Course Description:**

The course is a main curriculum for the students of food science or relevant major. It introduces the basic theories of momentum, heat and mass transfers, familiarizes students with the fundamental principles of some important unit operations applicable to food engineering and food processing situations. The main contents of the course include: Introduction; the unit operations applicable to food production about Fluid flow, Fluid transport, Separation of heterogeneous system; Evaporation, Absorption, Distillation, Refrigeration, Drying, Membrane separation, Liquid adsorption and Ion exchange in the process of the food production. By learning this course, the students should build the ability to understand and solve typical industrial problems using basic engineering principles of momentum transfer, heat transfer and mass transfer in the process of the food production, and the students should master the methods of solving the food engineering problems in the aspects of unit operation design and corresponding equipment selection.

**Recommended Textbooks/References:**

1. JIANG Shaotong, ZHOU Xianhan. Principle of Food Engineering. Chemical industry press,

- 2010.
2. YANG Tongzhou, YU Dianyu. Principle of Food Engineering (second Edition). China Agriculture Press. 2011.
  3. LI Yunfei, GE Keshan. Principle of Food Engineering (second Edition). China Agricultural University Press. 2009.
  4. R.P. Singh, and D.R. Heldman. Introduction to Food Engineering (4th Edition). Academic Press. 2008.

**Course Number: 0007222**

**Course Title: Food Technology**

**Credit: 3 Total Credit Hours: 48**

**Students:** Undergraduate students in Biotechnology

**Prerequisites:** The principle of food engineering, food biochemistry, Organic Chemistry, Food Microbiology

**Evaluation Method:** Written Exam

**Course Description:**

This course is the application of food science principle to study food resource selection, processing, packaging, storage and circulation. Its main task is to study influence factors of food quality, food shelf life, food nutritional value and food safety in the raw and auxiliary materials selection, preservation, processing, packaging, transportation. The students are expected to understand the basic concepts, theories, methods, and the related problem solving methods. Especially to master the same principles of food preservation and various types of processing technique, To cultivate students' food development and innovation capability, improve the analysis and solve problem of food science ability.

**Recommended Textbooks/References:**

1. XIA wenshui. Food technology. China Light Industry Press, 2011
2. LI Xinhua, DONG Haizhou. Grain and oil processing. China Agricultural University press, 2002
3. YE Xingqian. The processing technology of fruit and vegetable, China Agriculture Press, 2002

**Course Number: 0006890**

**Course Title: Standard and Regulation in Food**

**Credit: 2 Total Credit Hours: 32**

**Students:** Food Quality and Safety

**Prerequisites:** Food Quality Management, Introduction to Food Science

**Evaluation Method:** test

**Course Description:**

The domestic and the international food standards and regulations are introduced in this course. The students are expected to have the standardized awareness and the ability of using standards to practical problem. This course requires students to master the basic concepts of food standards and regulations, to know the Interdependent relationship between food standards and regulations, to

understand the status and role of food quality and health regulations, to learn the relationship between regulations, standards and market economy and food security system. Through this course, students can learn to develop food standards and food hygiene license, new varieties of health food, new resources of food, food additives, organic food, free food, ISO9000 quality management system certification procedures and systems for document preparation. The basic topics include: The basis of laws and regulations, domestic food laws and regulations, international food standards and regulations, knowledge of standardization, etc.

**Recommended Textbooks/References:**

1. ZHANG Shuihua, YU Yigang. Standard and Regulation in Food. China Light Industry Press, 2010
2. AI Zhilu, LU Maolin. Standard and Regulation in Food. Southeast University Press, 2006
3. WU Xiaotong, WANG Ermao. Food laws, regulations and standards. Science Press, 2010
4. ZHANG Jianxin, CHEN Zongdao. Standard and Regulation in Food. China Light Industry Press, 2005
5. ZHANG Jianxin. Food standards and technical regulations. China Agriculture Press, 2007
6. ZHOU Caiqiong. Standard and Regulation in Food. China Agricultural University Press, 2009

**Course Number: 0006898**

**Course Title: Introduction to Food Culture**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate Major in Food Quality and Safety

**Prerequisites:** Food Technology

**Evaluation Method:** Paper

**Course Description:**

This course is specialized direction courses for the undergraduates major in food quality and safety. The food culture is an important part of Chinese national culture and one of the important features of ethnic traditional culture.

Food culture is a particular social group development and utilization of food raw materials, food production and food consumption in the process of technology, science, art, as well as diet based on custom, tradition, the thought and the philosophy, namely the people of food production and food life manner, process, function, structure and the sum of all the food. Research on the food culture content is extremely rich. It can generally be carried out from two aspects: one is the selection of specific groups of diet culture phenomenon of the overall analysis and research; another is on the food culture phenomenon in a specific area of study and analysis.

The theories on food culture major in food professional students are necessary to grasp. It is the accumulation of knowledge to training students and can help students to improve the ability.

**Recommended Textbooks/References:**

1. XU Xinghai. An Introduction to food culture. Southeast University Press, 2008
2. ZHAO Rongguang. Introduction of Chinese dietary culture. Higher Education Press, 2003
3. DU Daming. Chinese food culture. Fudan University press, 2011

**Course Number: 0006899**

**Course Title: Food Commodity Science**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate students Major in Food Quality and Safety

**Prerequisites:** Food Analysis, Biochemistry

**Evaluation Method:** Exam

**Course Description:**

As the improvement of living standard of China people and diversity of the food species, food has been an unique commodity to meet the consumer's increasing multi-level and personalized healthy requirement. Food Commodity Science focuses on how to control the safety, quality and stability of food in the circulation field and elucidation of the quality standard and change rules of quality of food in the circulation process. The main contents of this course include the category, physic-chemical properties, nutritional characteristics, processing technology, quality standard, relevant influence factors and change rules of quality for fruit, grain, milk, meat, egg, tea, drink, sea food, seasoning and functional food. In addition, the food quality inspection methods such as sensory analysis, physical and chemical test and hygiene test, as well as the update relevant food theory are also introduced.

**Recommended Textbooks/References:**

1. Xue Lu, Liu Aiguo, Food Commodity Science, Chemical Industry Press, 2009.
2. Liu Beilin, Sun Ting, Qu Zhihua, Food Commodity Science, China Logistics Publishing House, 2005.
3. Jaing Xiaomei, Food Commodity Science, China Renmin University Press, 1995.
4. Yuan Changmin, Theory of modern commodity, Beijing Normal University Publishing Group, 2008.
5. Sun Yuanming, He Zhiqian, Food Nutrition Science, China Agriculture University Press, 2010

**Course Number: 0006901**

**Course Title: Food Additive**

**Credit: 2 Total Credit Hours: 32**

**Students:** Undergraduate Major in Food Quality and Safety

**Prerequisites:** Organic Chemistry, Biochemistry, Food Analysis

**Evaluation Method:** Test

**Course Description:**

With the development of food industry and diversity of the food species, food additive plays vital roles in improving the color, flavor and mouth feel, as well as the conservation and food process to meet the consumer's increasing requirement, and has been one of the most important subjects in food science and technology. This course introduces the basic concepts, category, safety and relevant control measures of food additives; and also emphasize the concept, physic-chemical properties, usage, safety evaluation, and interaction mechanism of food additives such as preservative agent and antibacterial agent, antioxidant, food color and color additive, chromogenic reagent and bleaching agent, emulgent, thickening agent and flavoring agent, etc.

**Recommended Textbooks/References:**

1. Hao Liping, Food Additive, China Agriculture University Press, 2009.

2. Sun Ping, Food Additive,,China Light Industry Press, 2009.
3. Wang Libing, Safety and Test of Food Additive, Science Press, 2011.
4. Lei Yang, Basis of Food Additive, Chemical Industry Press, 2011.

**Course Number: 0006900**

**Course Title: Raw Materials of Food**

**Credit: 1 Total Credit Hours: 32**

**Students:** Undergraduate students of food quality and safety

**Prerequisites:** Analytical Chemistry, Biochemistry, food microbiology

**Evaluation Method:** Examination

**Course Description:**

Raw Materials of Food is an optional courses for the undergraduate students of food quality and safety. This course is to discuss the various types, properties, characteristics and the use of food raw material. It can enable students to master the basic theory, types, characteristics and application of food raw material with the introduction of the species, morphological structure, quality inspection, storage and nutrition knowledge of food raw material. It is also important for student to grasp the quality inspection, storage and utilization of food materials by studying this course. The main contents of this course include: the nutritional distribution characteristics, the biological characteristics of grain raw materials and its relationship with processing, the general property of oil., the resource characteristics, nutritional and physiological characteristics, physiological characteristics, physical and processing properties, the chemical constituent of the meat raw materials, dairy raw materials, aquatic products.

**Recommended Textbooks/References:**

1. Jiang Aiming, Zhao Liqin. Food Materials (textbook of general “Higher Education Eleven Five” National Planning Textbook).Southeast University Press, 2007.
2. Li Lite. Food Materials(Textbook for 21st Century),China Agriculture Press. 2011.