

DEGREE AWARD

Bachelor of Science (Biomedical Sciences)

PERIOD OF STUDY

4 Years

SEMESTER OF COMMENCEMENT June (Summer), August (1st Semester), January (2nd Semester)

COURSE FEES Approximately 450,000 Baht (112,500 Baht per year)

COURSE DESCRIPTION AND PURPOSE

Biomedical sciences program provides knowledge of medical subjects covering Anatomy, Biochemistry, Ergonomics, Microbiology, Pathology, Pharmacology, Physiology, and Toxicology. All students will acquire not only basic and advance knowledge in biomedical areas but also research skills. Graduates are prepared for pursuing professions in biomedical careers.

EMPLOYMENT OUTCOMES

After completion of the program, graduates will be able to enter a vast range of healthrelated professions such as medical researcher, physiologist, microbiologist, health informatics expert, occupational health and safety expert, pharmaceutical product manager, and laboratory supervisor. Curriculum Structure :

| Total | | | 128 credits |
|---------------------------|-----|------------------------|-------------|
| General Education Courses | | | 30 credits |
| Specific Courses | | | 92 credits |
| 1) Basic science courses | | 15 credits | |
| 2) Major courses | | ses | 77 credits |
| | 2.1 | Major required Courses | 68 credits |
| | 2.2 | Major elective Courses | 9 credits |
| Free Elective Courses | | | 6 credits |

A) BASIC SCIENCE COURSES 15 CREDITS

| Code | Course Title | Credit |
|---------|--|-----------|
| BIO 131 | General Biology | 3 (3-0-6) |
| CHM 129 | Introduction to Chemistry | 4(3-3-8) |
| CHM 233 | Analytical Chemistry | 3(2-3-6) |
| PHY 135 | Life Science Physics | 3(2-3-6) |
| MAT 146 | Introductory to Statistics for Biomedical Sciences | 3(3-0-6) |

B) MAJOR REQUIRED COURSES 77 CREDITS

| Code | Course Title | Credit |
|---------|--|----------|
| ANA 100 | Basic Anatomy | 3(2-3-6) |
| PSO 100 | Basic Physiology | 3(3-0-6) |
| PSO 102 | Basic Physiology Laboratory | 1(0-3-2) |
| BCH 201 | Basic Biochemistry | 4(3-3-8) |
| PAT 203 | Basic Pathology | 3(3-0-6) |
| MIC 305 | Microbiology and Immunology | 4(3-3-8) |
| PMC 331 | Basic Pharmacology | 3(3-0-6) |
| BMS 103 | Introduction to Biomedical Sciences | 1(1-0-2) |
| BMS 104 | Introduction to Cell and Molecular Biology | 1(1-0-2) |
| BMS 211 | Biomedical Instrumentation and International | 3(2-3-6) |
| | Organization for Standardization | |

| BMS 214 | Ergonomics | 3(3-0-6) |
|---------|---|------------|
| BMS 215 | Applied Physiology | 3(3-0-6) |
| BMS 302 | Scientific Communication | 2(2-0-6) |
| BMS 322 | Genetic Engineering | 3(2-3-6) |
| BMS 323 | Bioinformatics | 2(1-3-4) |
| BMS 220 | Medical Science Organization and Management | 3(3-0-6) |
| BMS 324 | Research Methodology | 3(3-0-6) |
| BMS 329 | Medical Science Innovations | 2(2-0-4) |
| BMS 339 | Applied Microbiology and Immunology | 3(2-3-6) |
| BMS 341 | Seminar I | 1(0-3-2) |
| BMS 401 | Integrated Medical Sciences | 1(0-3-2) |
| BMS 403 | Microscopic Anatomy | 3(2-3-6) |
| BMS 418 | Toxicology | 3(2-3-6) |
| BMS 419 | Practical Training | 3(0-35-18) |
| BMS 420 | Medical Science Management | 2(2-0-4) |
| BMS 435 | Systemic Pathology | 3(2-3-6) |
| BMS 442 | Seminar II | 1(0-3-2) |
| BMS 495 | Senior Project | 4(0-12-6) |
| BMS 496 | Independent Study | 1(0-35-18) |
| BMS 497 | Cooperative Education | 6(0-35-18) |

MAJOR ELECTIVE COURSES 9 CREDITS

Students can select any subjects from list of course.

| Code | Course Title | Credit |
|---------|--|----------|
| BMS 404 | Neuroscience) | 3(2-3-6) |
| BMS 406 | Enzyme Technology | 3(3-0-6) |
| BMS 410 | Exercise Physiology | 3(3-0-6) |
| BMS 412 | Pharmaceutical Biotechnology | 3(3-0-6) |
| BMS 421 | Occupational Ergonomics | 3(2-3-6) |
| BMS 436 | Hematology | 3(2-3-6) |
| BMS 439 | Diagnostic Microbiology and Immunology | 3(2-3-6) |
| BMS 450 | Aging and Regenerative medicine | 3(3-0-6) |
| BMS 451 | Precision medicine | 3(3-0-6) |
| BMS 452 | Cosmetics and Nutraceutical | 3(3-0-6) |

BIO 131 General Biology

Basic cell biology, structure and function of cell, cell division and human tissue functions, genetics, system functions; nervous system, blood circulation, respiration, excretion, muscular, digestion and reproductive system.

CHM 129 Introduction to Chemistry 4(3-3-8)

Stoichiometry, atomic structure, chemical bonding, solution, chemical equilibrium, acid-base equilibrium, electrochemical, chemical thermodynamics, organic chemistry, chemical reaction, organic substances.

CHM 233 Analytical Chemistry 3(2-3-6)

Prerequisite : CHM 129 Introduction to Chemistry

Quantitative chemical analysis; gravimetric analysis, volumetric analysis, chemical equilibrium, instrumental analysis; potentiometry, colorimetry, spectrometry, electrogravimetry, coulombmetry chromatography, ion exchange and its application.

PHY 135 Life Science Physics 3(2-3-6)

Units and measurements, kinematics of translational and rotational motion, dynamics of translational and rotational motion, work energy and power of the body, elastic properties of the skeleton and tissues, fluid mechanics and physical properties of fluids, heat and thermodynamics, sound waves and hearing, optics and optical instruments, elementary electricity and electronic, radiation physics, physics of nuclear medicine.

3(3-0-6)

MAT 146 Introduction to Statistics for Biomedical Sciences 2(2-0-4)

Basic theory, concepts and application and probability distributions in various events, interpretation of statistical values, descriptive statistics, population and sample, probability distribution, confident interval theorem, hypothesis testing, analysis of variance, regression analysis and data analysis by application software.

ANA 100 Basic Anatomy 3(2-3-6)

Structure of human body; method of classification organ systems and tissues; histology of specific tissues, organs functions; development, tissue injury and repair, organ transplantation, genetic material, fertility, growth and development.

PSO 100 Basic Physiology 3(3-0-6) Basic normal functions from cells to organ systems, muscle, nervous, cardiovascular, respiratory, gastrointestinal, endocrine, and reproductive systems.

PSO 102 Laboratory in Basic Physiology 1(0-3-2) Corequisite : PSO 100 Basic Physiology

Laboratory in physiology, mechanism of cell function: muscle, nervous, cardiovascular, respiratory, and renal systems.

BCH 201 Basic Biochemistry

4(3-3-8)

Prerequisite: CHM 129 Introduction to Chemistry

Structures and functions of biomolecules; protein, carbohydrates, fat, nucleic acid, vitamin in aspect of synthesis, digestion, absorption, metabolism; genetic diseases; malnutrition and prevention.

PAT 203 Basic Pathology 3(3-0-6)

Prerequisite: ANA 100 Basic Anatomy

Pathologic changes of cells/tissues from various injuries, responses to the injuries, immunologic disorders, neoplasm, infectious diseases, genetic disorders, nutritional imbalance, diseases of infants.

MIC 305 Microbiology and Immunology 4(3-3-8)

Prerequisite: BIO 131 General Biology

Various types of microorganisms; bacteria, fungi, parasite and virus; structural components and their functions, cultivation, growth, metabolisms, genetics and controls of the microorganism; microbial virulence factors, microbial pathogenesis and host responses to microbial infections; immune defense mechanisms, complement system, immune responses to infectious agents, hypersensitivity and autoimmune diseases.

PMC 331 Basic Pharmacology

Definition and importance of drugs on human well-being, drug classifications, drug sources, drug development, legal aspect of drug regulation, drug administration and regimen, pharmacokinetics, pharmacodynamics, indications contraindications, precautions, side effects, unwanted effects drug interactions and common used drugs.

BMS 103 Introduction to Biomedical Sciences 1(1-0-2)

Basic knowledge in biomedical sciences and concepts of application; anatomy, biochemistry, physiology, microbiology, immunology, pathology, pharmacology and toxicology; organization career path related to biomedical sciences including government and private sectors; exhibition in biomedical sciences; field trips.

BMS 104 Introduction to Cell and Molecular Biology 1(1-0-2)

Structure and function of cell, cell components, cell chemistry, cell-cell and cell-matrix adhesions, cell differentiation, cell cycle, cell motility, membrane transport and membrane potential, intracellular and intercellular communication, cell signaling.

 BMS 211
 Biomedical Instrumentation and International
 3(2-3-6)

 Organization for Standardization
 Prerequisite: PHY 135 Life Science Physics

Application and laboratory techniques in using major biomedical instruments; UV spectrophotometer, fluorospectrophotometer, ultrasonic centrifuge, beta-counter, atomic

3(3-0-6)

absorption, Gas Chromatography, High Performance Liquid Chromatography and microtome; theory and integration management in International Organization for Standardization (ISO).

BMS 214 Ergonomics 3(3-0-6)

Prerequisite: PSO 100 Basic Physiology

Multidisciplinary study of systemic human factors and technology, factors play a role in ergonomics; body postures and movements, environmental factors, information exchange and control of the machine and type of activities in tasks and jobs.

BMS 215 Applied Physiology 3(3-0-6)

Prerequisite: PSO 100 Basic Physiology

Integrative function of human organ systems at all levels from the cellular, tissue, organ to whole body; the integrated responses of whole body systems to maintain homeostasis in response to disturbance from external environment.

BMS 302 Scientific Communication 2(2-0-6)

Application of public relations to initiate ideas in the field of science and get them known to the public; awareness of importance of science and technology; scientific thinking process and use in daily life.

BMS 322 Genetic Engineering

Prerequisite: BCH 201 Basic Biochemistry

DNA structure and function, PCR technology; restriction enzymes and applications including RFLP and DNA fingerprint, recombinant DNA technology and transferring techniques of recombinant vector; recombinant protein expression in both prokaryote and eukaryote systems, purification and characterization of gene product; DNA sequencing techniques.

BMS 323 Bioinformatics 2(1-3-4)

Prerequisite: BCH 201 Basic Biochemistry

Searching of biomedical information from internet, search and present minireview articles from previously reported papers (MEDLINE-PubMed), storing, analyzing, interpreting biological data and its applications in biomedical sciences.

BMS 324 Research Methodology 3(3-0-6)

Principles and methods in biomedical sciences research, identification of research problems, formulation of research objectives and hypotheses, collection of data, data analysis biostatistics and interpretation, application of statistics for research, report writing and presentation, ethics in human research and experimental animals in science.

3(2-3-6)

BMS 329 Medical Science Innovations

Innovations in medical sciences, genetic engineering, biotechnology for diagnosis and therapy; DNA-based diagnostics, protein-based diagnostics, metabolite-based diagnostics or metabolites as disease markers; stem cell technology, assisted reproductive technology, drug delivery systems, gene therapy, pharmacogenomics, safety of biotechnology, patent registration, data searching, criticized and decision making, project in medical science innovation.

BMS 339 Applied Microbiology and Immunology 3(2-3-6) Prerequisite: MIC 305 Microbiology and Immunology 3(2-3-6)

Principle and application of knowledge in Microbiology and Immunology, infectious disease control, diagnostic techniques for infectious diseases, microbial applications in food and pharmaceutical industry, agriculture and environment.

Practice in presentation process for current research in biomedical sciences; articles reading, data base utilization, oral presentation and group discussion.

BMS 401 Integrated Medical Sciences 1(0-3-2)

Problem-Based Learning and case study by integrating basic knowledge of anatomy, biochemistry, physiology, immunology, microbiology, parasitology, pathology, pharmacology and toxicology.

2(2-0-4)

BMS 403 Microscopic Anatomy

Prerequisite: ANA 100 Basic Anatomy

Principles of microscopic anatomy: microscopic anatomy of cells, epithelia, connective tissue, cartilage, bone, muscular tissue and nervous tissue, and systemic microscopic anatomy; integumentary system, respiratory system, cardiovascular system, digestive system, urinary system, endocrine system, reproductive system and special sense organs; microscopic anatomy laboratory.

BMS 418 Toxicology 3(2-3-6)

Prerequisite: PMC 331 Basic Pharmacology

Toxic agents and classification, physico-chemical properties of toxic agents, factors related to toxic effects, toxicokinetics, toxicodynamics, sources of toxic agents; industrial, agriculture, food and drugs, plants and animals, environment, mechanisms and pathology from toxic agents, toxicity testing and risk assessment, organizations related to toxicology.

BMS 419 Practical Training

3(0-35-18)

Prerequisite: BMS 324 Research Methodology

Training in the institutes related to biomedical sciences with the minimum limits of 8 working weeks.

3(2-3-6)

BMS 420 Medical Science Management

Concept and principles of organization and management in medical science, organization structure and organizing of government and private sectors, human resource management, budget, corporate communication, quality assurance system, ethics and medical laws, strategic management in biomedical sciences, informatic system in public health.

BMS 435 Systemic Pathology 3(2-3-6)

Prerequisite: PAT 203 Basic Pathology

Principles of pathology and mechanisms of systemic pathogenesis;nervous system, cardiovascular system, respiratory system, digestive system, liver and bile passage, urinary system, musculoskeletal system, endocrine system, reproductive system, laboratory and case study.

BMS 442 Seminar II 1(0-3-2)

Practice in presentation process for current research in biomedical sciences; articles reading, data base utilization, oral presentation and group discussionin English.

| BMS 495 | Senior Project | 4(0-12-6) |
|---------|----------------|-----------|
| | | |

Prerequisite: BMS 324 Research Methodology

Discussion and laboratory exercises in experimental design, theory of measurements, data presentation, statistical analysis, data interpretation and publication.

2(2-0-4)

BMS 496 Independent study

Prerequisite: BMS 324 Research Methodology

Introduction to research experimentations in biomedical sciences, writing of report summarized from research, present the experimental result under the supervision of advisor, pre-cooperative education.

BMS 497 Cooperative Education 6(0-35-18)

Prerequisite: BMS 496 Independent study

Participation in a cooperative organization related to biomedical sciences for at least 16 weeks, work experience under supervision of both college and employer, report writing and presentation.

BMS 404 Neuroscience 3(2-3-6)

Prerequisite: ANA 100 Basic Anatomy

Principles of neuron and nervous system, neurotransmitters, neuronal connections, brain structures and functions, neurophysiology, motor and sensory systems, higher center control: learning, memory, speech and language, sleep, dream, emotion; neuroscience laboratory.

1(0-35-18)

BMS 406 Enzyme Technology

3(3-0-6)

Prerequisite: BCH 201 Basic Biochemistry

Principles of bacterial strain selection and enzyme production, enzyme extraction and purification, principles of immobilized enzyme, applications of enzyme used in medical science and industry.

BMS 410Exercise Physiology3(3-0-6)

Prerequisite: PSO 100 Basic Physiology

Effect of exercise on physiological changes, types of exercise, aerobic and anaerobic power testing, effect of exercise on general health: cardiovascular, respiratory, and endocrine systems, the benefit of exercise to physical health.

BMS 412 Pharmaceutical Biotechnology 3(3-0-6)

Prerequisite: PMC 331 Basic Pharmacology

New drug discovery and development, clinical trials, pharmaceutical dosage forms, biopharmaceuticals, proteins as drugs, development of novel drug delivery systems, drug registration, drug laws; laboratory and field trip.

BMS 421 Occupational Ergonomics

Prerequisite: BMS 214 Ergonomics

Implementation of ergonomics knowledge in design and re-design of working systems in various occupations in order to minimize risks from external workload determining factors; task, organization and environments, physiological and psychological responses of human operators are used as an evaluation tool through questioning the exposed users about their experiences, effects caused by psychosomatic and functional measurements.

BMS 436 Hematology 3(2-3-6)

Prerequisite: PAT 203 Basic Pathology

Red blood cells, white blood cells and hemostasis, pathophysiology of hematological system, hematologic disorders, essential laboratory diagnosis, applications in hematological researches.

BMS 439Diagnostic Microbiology and Immunology3(2-3-6)

Prerequisite: MIC 305 Microbiology and Immunology

Principles and practice of laboratory techniques for diagnosis of infectious diseases caused by bacteria, viruses, parasites and fungi, clinical specimens of choice, specimen collection and transport, laboratory techniques including antigen or antibody detection, DNA-based diagnostics, protein-based diagnostics, metabolite-based diagnostics or metabolites as disease markers.

3(2-3-6)

BMS 450 Aging and Regenerative medicine

Aging and regenerative medicine, biological of aging, aging of nervous system, aging of circulatory system, aging of endocrine system, aging of skin system, molecular biology basis for regenerative medicine, regenerative medicine for degenerative disease, and alternative medicine for healthy

BMS 451 Precision medicine

Human genetics and genomes, pharmacogenomics, advances in genetics information technology, genetic testing and biomarkers, individual drug therapy, drug discovery and development, genetic markers-based health care

BMS 452 Cosmetics and Nutraceuticals 3(3-0-6)

Fundamental concepts of cosmetic science, basic physiology of skin, hair, eyes, nail, concept of cosmetic formulations, quality control and regulations of cosmetic products, definition of nutraceuticals, discovery and classification of nutraceuticals, nutraceutical products in healthcare, nutraceutical products in therapy, drug interaction and adverse effects of

3(3-0-6)

3(3-0-6)