Doctor of Philosophy Program in Microbiology (International Program)

In reviewing process, the subjects will be slightly adapted
Clarification of the code
Example 3((3)-0-6)
Number of credit((lecture hrs*)-lab hrs*-self-study hrs*)
*hrs per week

326-500 (Essential Immunology and Molecular Biology) 1(1-0-2)
Prerequisite: Consent of the program committee
Antigen, antibody, antigen-antibody reaction; cells in immune response; complements, cytokines, immune system; microbial genetics; gene cloning technology and applications; polymerase chain reaction; bioinformatics

326-501 (Modern Microbiology) 3 (3-0-6)
Immunology; Bacteriology; Mycology; Virology; Parasitology; microbial pathogenecity; application of microorganisms in industry, environment and case study; internet searching for current knowledge

326-502 (Research Methodology in Microbiology) 3(3-0-6)
Prerequisite: Consent of the program committee
Experimental designs in microbiological research; writing research proposal and review articles; data analysis and discussion; bio-statistic in research methodology; research publications; ethic of researchers

326-503 (Modern Techniques in Microbiology) 3 (2-3-4)
Bioinformatics; next generation sequencing; antibody detection and separation; antibody engineering; proteomics; recombinant DNA technology; heterologous gene expression

326-512 (Microbial Physiology) 3(2-3-4)
Prerequisite: 326-501 or Consent of the program committee
Structures in microbial cells and functions; microbial growth and control; transportation in and out of microbial cells; energy production based on organic, inorganic matters and light, metabolisms of carbohydrate, lipid and nitrogen compounds; amino acid synthesis; control of metabolisms; endospore formation; metabolomics and metabolic engineering

326-513 (Microbial Genetics) 3(2-3-4)

Prerequisite: 326-501 or Consent of the program committee

Genomic structure; transcription and translation; regulation of gene expression; gene transfer; microbial mutations; genetic engineering and gene cloning technology; polymerase chain reaction and applications; DNA sequencing and bioinformatics

326-521 (Food Microbiology) 3(2-3-4)

Prerequisite: 326-501 or Consent of the program committee

Important microorganisms in food, roles of microorganisms in food and controlling processes; food preservation; food sanitation; food control

326-523 (Industrial Microbiology) 3(2-3-4)

Prerequisite: 326-501 or Consent of the program committee

Industrial importance of microorganisms; methods for isolation and screening of microorganisms from various sources for industrial uses; mutation techniques for improving strains and preservation techniques of microorganisms; various types of fermentation processes, kinetics of growth and product formation; basic configuration of bioreactor, sterilization processes, products recovery and purification; industrial-scale processing of microbial products (organic acids, enzymes, antibiotics, amino acid and vitamin)

326-524 (Environmental Microbiology) 3(2-3-4)

Prerequisite: 326-501 or Consent of the program committee

Relationship between microorganisms and environments; environmental balance with microorganisms; bioremediation of polluted soil, water and air

326-525 (Microbial Fermentation) 3(2-3-4)

Prerequisite: 326-501 or Consent of the program committee

Microbial fermentation; preparation of bio-reacters and starter; sterilization processes; kinetics of fermentation and control; product recovery; industrial fermentation

326-526 (Microbial Enzymology and Applications) 3(2-3-4)

Prerequisite: 326-501 or Consent of the program committee

Fundamental aspect of microbial enzymes, structure, classification and kinetics; isolation and screening of microorganisms, production and regulation, extraction and purification of enzymes; characterization of enzymes; enzyme engineering; enzyme immobilization; applications of enzymes in industry

326-529 (Antimicrobial Susceptibility Test and Microbial Assay) 3(2-3-4)
Prerequisite: 326-501 or Consent of the program committee
Antimicrobial susceptibility testings; antibiotic resistance; the measurement of antibiotics in human body fluid; microbial assay of antibiotics and vitamins; microbial testing

326-531 (Molecular Microbiology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Current knowledge of microorganisms and methodology at the molecular level, beneficial uses in research and applications in medicine, biotechnology and environment

326-533 (Yeast for Industry) 3(2-3-4)
Prerequisite: 326-501 or Consent of the program committee
Morphology and physiology of yeasts; beneficial use of yeasts in the food industry, beverages, energy, agriculture; strain development by gene technology for new products or increasing product yields

326-535 (Thai Local Wisdom and Microorganisms) 3(2-3-4)
Prerequisite: 326-501 or Consent of the program committee
Roles of microorganisms in Thai local wisdom; agriculture, fermentation industries, environment and health; self studies from local people; analysis and discussion of particular local wisdom based on knowledge in microbiology for improvement and development

326-542 (Bacterial Systematics) 2(1-3-2)
Prerequisite: 326-501 or Consent of the program committee
Modern bacterial classification namely polyphasic taxonomy based on data available from numerical taxonomy, chemotaxonomy and molecular systematics, analysis of bacterial relatedness using bioinformatics technology

326-551 (Immunobiology) 3(2-3-4)
Prerequisite: 326-501 or Consent of the program committee
Properties of antigen and antibody; antigen-antibody interaction; cells in the immune system and production for immune response; complements; cytokines; immunogenetics; response to foreign antigen; advantages and pathology from the immune response

326-552 (Infection and Immunity) 2(2-0-4)

Prerequisite: 326-501 or Consent of the program committee
Properties of various infection agents; mechanisms of infection by bacteria, fungi, parasites and viruses; immunopathogenesis; interaction with antibody; cells of the immune system; modulation of the immune system by complements and cytokines; immunity in human mucosa, respiratory tract, digestive system and reproductive system

326-553 (Techniques in Immunology) 2(1-3-2)
Prerequisite: 326-501 or Consent of the program committee
Animal model, cellular, biochemical and molecular biology techniques used in immunological research; ELISA; Western blots; FLOW cytometry; surface plasmon resonance; monoclonal antibody technology; phage display; transgenic mice; V sequence analysis using the IMGT database

326-571 (Parasitology) 3(2-3-4)
Prerequisite: 326-501 or Consent of the program committee
Various groups of parasites in human, plant and animal; life cycle of parasites; mechanisms in the host-parasite relationship; transmission; pathogenesis; diagnosis, prevention, control and treatment of parasitic infections

326- 581 (Virology) 2(2-0-4)
Prerequisite: 326-501 or Consent of the program committee
General properties, classification, viral genetics, multiplication and cultivation of viruses; diagnosis; advantages and disadvantages of human pathogenic viruses; bacterial viruses, plant viruses and insect viruses

326-595 (Special Topics in Microbiology I) 1(1-0-2)
Prerequisite: 326-501 or Consent of the program committee
Current issues in Microbiology; lecture and discussion by specialist

326-596 (Special Topics in Microbiology II) 1(1-0-2)
Prerequisite: 326-501 or Consent of the program committee
Current issues in Microbiology; lecture and discussion by specialist

326-602 (Advanced Methods in Microbiology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research from published academic articles on theory, practise and using of scientific instruments

326-611 (Mechanisms of Microbial Pathogenesis) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Cellular and molecular mechanisms of pathogenesis during the course of infection by bacteria, fungi, viruses and parasites; interaction between infectious agents and host

326-612 (Advanced Microbial Physiology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research from published academic articles on cell structures, growth and metabolic pathways of microorganisms

326-613 (Advanced Microbial Genetics) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research from published academic articles on genetic engineering, synthesis, regulation, transfer and exchange of genetic material in microorganisms

326-641 (Advanced Bacteriology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on bacteriology from published academic articles

326-651 (Advanced Immunology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on immunology from published academic articles

326-661 (Advanced Mycology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on mold and yeasts from published academic articles

326-671 (Advanced Parasitology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on parasitology from published academic articles

326-681 (Advanced Virology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on virology from published academic articles

326-701 (Advanced Medical Microbiology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on medical microbiology from published academic articles

326-703 (Advanced Microbiology) 3(3-0-6)
Prerequisite: 326-501 or Consent of the program committee
Presentation and discussion of current knowledge, technique and research on applied microbiology from published academic articles

326-791 (Thesis) 72(0-216-0)
Research work in microbiology under supervision of a thesis advisor

326-792 (Thesis) 48(0-144-0)
Research work in microbiology under supervision of a thesis advisor

326-793 (Seminar in Microbiology I) 1(0-2-1)
Prerequisite: Enrolled for at least 1 semester or Consent of the program committee
Oral presentation of current research in Microbiology from published research articles

326-794 (Seminar in Microbiology II) 1(0-2-1)
Prerequisite: Enrolled for at least 2 semesters or Consent of the program committee
Oral presentation of current research in Microbiology from published research articles or thesis

326-795 (Seminar in Microbiology III) 1(0-2-1)
Prerequisite: Consent of the program committee
Oral presentation of current research in Microbiology from published research articles or thesis

326-796 (Seminar in Microbiology IV) **1(0-2-1)**
Prerequisite: Consent of the program committee
Oral presentation of current research in Microbiology from published research articles or thesis

326-797 (Seminar in Microbiology V) **1(0-2-1)**
Prerequisite: Consent of the program committee
Oral presentation of current research in Microbiology from published research articles or thesis

326-798 (Seminar in Microbiology VI) **1(0-2-1)**
Prerequisite: Consent of the program committee
Oral presentation of current research in Microbiology from published research articles or thesis

326-799 (Special Problems in Microbiology) **3(0-6-3)**
Study of special problems in microbiology; writing a paper work and presentation

326-891 (Thesis) **48(0-144-0)**
Research work in microbiology under supervision of a thesis advisor

326-892 (Thesis) **36(0-108-0)**
Research work in microbiology under supervision of a thesis advisor

327-501 (Laboratory in Modern Microbiology) **1(0-3-0)**
Prerequisite: Concurrent to 326-501
Current knowledge and practical techniques in modern microbiology correspondence with 326-501; oral presentation from internet searching