912. Theory of Plates
Winter. 4(4-0) CEM 315, or C E 804 or approval of department. MTH 422, Interdepartmental with Civil Engineering.
Bending of thin elastic plates with various shapes and boundary conditions; applications of energy principles and approximate methods of solution; thick plates; large deflection theory; sandwich plates.

915. Theory of Elasticity II
Spring. 3(3-0) MTH 813 or approval of department.
Saint-Venant bending and torsion. Problems in three-dimensional linear elasticity using the Galerkin vector and Neuber-Papkovitch functions.

918. Theory of Viscoelasticity
Fall of even-numbered years. 3(3-0) MTH 810, MTH 422 or approval of department.
Fundamental linear viscoelastic stress-strain relations, Model representation. Three dimensional and general deformation laws. Correspondence principle. Quasi-static, dynamic and buckling problems.

920. Theory of Vibrations II
Winter of odd-numbered years. 4(4-0) MTH 822. M E 823 or approval of department.
Interdepartmental with the Department of Mechanical Engineering.

921. Theory of Vibrations III
Spring of odd-numbered years. Summer. 4(4-0) MTH 920 or approval of department. Interdepartmental with the Department of Mechanical Engineering.

942. Advanced Topics in the Kinetics of Phase Transformation
Fall of odd-numbered years; Winter and Spring of even-numbered years. 3(3-0) May receive for a maximum of 3 credits.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

### Microbiology and Public Health

#### MPH

**College of Human Medicine**

**College of Natural Science**

**College of Osteopathic Medicine**

**College of Veterinary Medicine**

**200. Elementary Microbiology**

Fall, Winter. 4(3-2) Three terms of Natural Science. Primarily for majors outside the College of Natural Science.
Description of bacteria and related forms of microorganisms, their growth and nature, their application in industry, and their control in public health.

234. Elementary Medical Microbiology

Fall. 5(4-4) CEM 130, B S 211, approval of department.
Survey of immunology and microbiology with emphasis on pathogenic microorganisms, antimicrobial agents, and laboratory diagnosis.

301. Introductory Microbiology

Fall, Winter, Spring. 3(3-0) CEM 242, CEM 244 or BCH 200.
Fundamentals of microbiology. Range of cell structure and activities, nutrition, growth, and importance of major microbial groups.

302. Introductory Microbiology Laboratory

Fall, Winter, Spring. 2(0-4) MPH 301 or concurrently.
Methodology of microbiology including microscopy, staining, asepsis, cultural media and quantification.

316. Food Safety and Microbiology

Fall. 4(3-3) Juniors; CEM 132 or concurrently or approval of department. Not open to students with credit in FSC 440. Interdepartmental with and administered by the Department of Food Science and Technology.
Effects of food handling, preparation and service on food safety. Microorganisms in foods, sanitation, foodborne disease and food service regulations.

400. Bacteriology for High School Science

Summer. 4(4-4) Bachelor's degree and teaching certificate.
Fundamental concepts, experiments, and projects useful in secondary school science courses.

400H. Honors Research

Fall, Winter, Spring, Summer. 2 credits. May enroll for a maximum of 8 credits. Approval of department.
A four-term research project with thesis.

406. Medical Mycology

Fall, Spring. 4(2-6) BOT 402 or approval of department. Interdepartmental with and administered by the Department of Botany and Plant Pathology.
Characteristics, habits, and laboratory identification of fungi diseases infecting humans. Emphasis on laboratory techniques and morphological characteristics of the various mycoses.

413. General Virology

Winter. 3(3-0) MPH 427 or concurrently.
Physical, chemical, and biological properties of the viruses.

414. General Virology Laboratory

Winter. 1(0-4) MPH 413 or concurrently.
Laboratory procedures employed for cultivation and identification of viruses.

416. General Parasitology

Fall. 3(3-0) B S 210, B S 211, B S 212 or LBC 141.
Life history, host-parasite relationships (including physiology, immunology, immunopathology and pathology) and epidemiology of selected groups and species of protozoan, trematode, cestode and nematode parasites.

417. General Parasitology Laboratory

Fall. 2(0-4) MPH 416 or concurrently or approval of department.
Identification and life histories of representative species of major groups of animal parasites. Selected examples of host-parasite associations will be tested experimentally.

420. Ecology of Animal Parasites

Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with the departments of Fisheries and Wildlife, and Zoology.
Parasitism of animals by protozoa, helminths and arthropods with emphasis on the interrelationships of host-parasite associations with the natural environments.

421. Microbial Physiology and Genetics

Winter. 4(4-0) MPH 301, MPH 302; BCH 401 or BCH 452 or concurrently.
Cell structure and function, macromolecular synthesis and control, genetic capabilities of microorganisms.

422. Microbial Physiology Laboratory

Winter. 2(0-6) MPH 421 or concurrently.
Laboratory work based upon the subject matter in MPH 421.

424. Microbial Genetics Laboratory

Spring. 2(0-6)
Laboratory work in microbial genetics.

425. Microbial Ecology

Spring. 4(4-0) MPH 301 or approval of department.
Fundamental concepts of microbial ecology. Emphasis will be placed on aquatic and soil habitats.

427. Immunobiology

Winter. 3(3-4) B S 212, BCH 300 or BCH 401.
Biological and biochemical mechanisms of the immune response. Emphasis is on concepts of immunity.

428. Immunobiology Laboratory

Winter. 2(0-6) MPH 427 or concurrently.
Basic laboratory techniques in immunobiology.

429. Microbiology of Infectious Diseases

Spring. 3(2-8) MPH 302, MPH 427.
Biological, immunological, pathogenicity, and medical aspects of microorganisms associated with infectious diseases of man. Methods of isolation and identification are emphasized in the laboratory.

431. Bacterial Diversity

Spring. 3(3-4) MPH 421.
Morphological and physiological properties of diverse groups of bacteria, and how these properties relate to their ecological niche and importance. Representative groups will be isolated and characterized.

437. Introductory Medical Parasitology Laboratory

Fall, Winter. 2(1-4) MPH 416 or concurrently or approval of department. Primarily for Medical Technology students.
Laboratory diagnosis of protozoan, helminth, and arthropod infections of man.
531C. Medical Microbiology: Virology
Fall, 3(2-2) Fourth-term Veterinary Medicine students or approval of department.
General properties of animal viruses; pathogenesis, immune response and immunopathology in viral diseases; principles of clinical virology.

531D. Medical Microbiology: Parasitology
Winter, 4(3-3) Fifth-term Veterinary Medicine students or approval of department.
Basic principles of parasitology (protozoology, helminthology, and entomology) and their relation to disease in animals.

618. Infectious Disease Clerkship
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. MPH 602 and MED 608 or H D 989. Interdepartmental with and administered by the Department of Medicine.
The clerkship emphasizes acquisition in depth of knowledge and skills essential in solution of clinical problems in infectious and immunologic diseases. Integrated basic science input is afforded through relevant seminars.

511. Medical Microbiology and Immunology
Spring. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.
Basic principles of microbiology (bacteriology, virology, mycology and parasitology) and immunology. Selected type-infections relate these principles to disease in man.

512. Infectious Diseases
Fall, 4(3-3) MPH 511, or approval of department. Interdepartmental with the Department of Medicine.
Infectious diseases of man, including biology of the causative microorganism, epidemiology, pathogenesis, host-parasite relationships, clinical and laboratory diagnosis, and clinical management.

521. Medical Microbiology and Immunology
Winter. Variable credit. May reenroll for a maximum of 6 credits. A biochemistry course. Enrollment in College of Human Medicine is approval of department.
Basic principles of microbiology (bacteriology, virology, mycology, and parasitology) and immunology. Selected type-infections relate these principles to disease in man.

531A. Medical Microbiology: Immunology
Winter, 4(3-2) Second-term Veterinary Medicine students or approval of department.
Basic principles of immunology (immunobiology and immunochemistry) and their relation to disease in animals.

531B. Medical Microbiology: Bacteriology and Mycology
Spring, 5(3-6) Third-term Veterinary Medicine students or approval of department.
Basic principles of bacteriology and mycology and their relation to disease in animals.

528. Immunochemistry Laboratory
Spring. 2(0-6) MPH 427, MPH 827 or concurrently.
Laboratory based partially on subject matter of MPH 827. Experimental techniques used in immunological assays and immune systems.

829. Host-Parasite Relationships
Fall. 3(3-0) MPH 427, MPH 429 or approval of department.
Pathogenesis and host responses to selected bacterial, parasitic, and fungal pathogens. Emphasis is on current research models which exemplify a variety of host-parasite relationships.

842. Advanced Soil Microbiology
Spring, 3(3-0) MPH 425 or approval of department. Interdepartmental with the Department of Crop and Soil Sciences.
Biochemistry, biology, and community ecology of microorganisms indigenous to soil. Emphasis on current research problems.

843. Soil Microbiology Laboratory
Spring, 2(0-6) MPH 542 concurrently or approval of department. Interdepartmental with the Department of Crop and Soil Sciences.
Fundamental techniques of dealing with microorganisms indigenous to soil. Metabolic activity of microorganisms. Interaction between microorganisms and plants.

599. Special Problems in Microbiology
Fall, Winter, Spring, Summer. 2 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.
Tutorial instruction in laboratory or library research for advanced undergraduates.

800. Seminar
Fall, Winter, Spring, Summer. 1(1-0) May reenroll for a maximum of 9 credits. Approval of department.

810. Topics in Microbiology
Fall, Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 10 credits if different topic is taken. Approval of department.
Topics will be selected from taxonomic subdisciplines such as bacteriology, virology, protozoology, mycology, and helminthology. From transacting disciplines such as microbial genetics, immunology, physiology, and ecology.

813. Molecular Virology
Fall, 4(4-0) Background in biochemistry, and approval of department. Molecular nature and biochemistry of replication of bacterial and animal viruses. Emphasis is on current advances, research concepts, and the role of viruses in molecular biology research.

821. Advanced Microbial Physiology and Genetics
Fall, 4(4-0) MPH 421.
Mechanism and regulation of physiologic and metabolic activities unique to procaryotes: fermentation, photosynthesis and respiration, autorotrophy, and RNA and DNA synthesis.

826. Ecology of Animal Parasites
Summer. 3 credits. MPH 416, approval of department. Given at W. K. Kellogg Biological Station.
Interaction of parasitic animals (protozoa, helminths, and arthropods) with their natural environment, including host, biotic and physical aspects.

827. Immunochemistry
Spring, 3(3-6) MPH 427; BCH 452 or ZOL 441, and CEM 383 recommended.
Structure and reactivity of antigens and antibodies; synthesis of immunoglobulins. Emphasis is on current advances and research concepts.

Military Science - Descriptions of Courses

Military Science - M S
All University

041. General Military Science
Application of leadership techniques, the decision making process and staff planning. Military customs and traditions. Students will concurrently enroll in a selected non-Military Science course to fulfill military professional requirements.