### 440. *Food Microbiology*

*Spring. 5(3-4) MPH 200 or MPH 301 or approval of department. Interdepartmental with and administered by Food Science.*

Major groups of microorganisms of importance to the food industry are studied with emphasis on ecological, physiological, and public health aspects.

### 444. *Environmental Microbiology*

*Spring. 3(2-4) MPH 200 or MPH 301.*

Flora, methods of testing, and purification of environmental air and water. Treatment and disposal of sewage.

### 462. *Medical Immunology*

*Winter. 2(2-0) MPH 301, MPH 302. Students may not receive credit in both MPH 405 and MPH 462.*

Humoral and cellular immune responses to bacterial antigens.

### 463. *Medical Microbiology*

*Winter. 2(2-0) MPH 301, MPH 302.*

Fundamental properties of bacterial pathogens and bacterial disease.

### 464. *Medical Microbiology and Immunology Laboratory*

*Winter. 2(0-6) MPH 462, MPH 463 or concurrently.*

Basic immunologic and taxonomic laboratory techniques of selected bacterial pathogens.

### 490. *Special Problems in Microbiology*

*Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.*

Tutorial instruction in laboratory or library research for advanced undergraduates.

### 503. *Cell Biology*

*Fall. 5(5-0) Admission to the College of Human Medicine. Interdepartmental with the departments of Biochemistry, Physiology, and Pharmacology and Toxicology.*

Principles of cell biology for medical students.

### 511. *Medical Microbiology and Immunology*

*Fall. 1 to 5 credits. May reenroll for a maximum of 5 credits. A biochemistry course. Enrollment in College of Human Medicine or approval of department.*

Basic principles of microbiology (bacteriology, virology, mycology and parasitology) and immunology. Selected type-infections relate these principles to disease in humans.

### 512. *Infectious Diseases*

*Winter. 4(3-3) MPH 511, or approval of department. Interdepartmental with the Department of Medicine.*

Infectious diseases of humans, 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 Osteopathic Medicine or 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.

### 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 immunoprophylasis 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. H M 602 and MED 608 or PHD 608. 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.

### 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 subsciences such as bacteriology, virology, protozoology, mycology, and helminthology; from transecting 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*

*Spring. 4(4-0) MPH 421.*

Mechanism and regulation of physiologic and metabolic activites unique to procaryotes including fermentation, photosynthesis, respiration and autotrophy.

### 827. *Immunochemistry*

*Spring. 3(3-0) 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.

### 828. *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-parsite relationships.

### 842. *Advanced Soil Microbiology*

*Fall of odd-numbered years. 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*

*Fall of odd-numbered years. 2(0-6) MPH 842 concurrently or approval of department. Interdepartmental with the Department of Crop and Soil Sciences.*

Fundamenta techniques of dealing with microorganisms indigents to soil. Metabolic activity of microorganisms. Interaction between microorganisms and plants.

### 890. *Special Problems in Microbiology*

*Fall, Winter, Spring, Summer. 2 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.*

### 899. *Master's Thesis Research*

*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

### 900. *Topics in Microbiology*

*Fall, Winter, Spring, Summer. 2(2-0) May reenroll if different topic is taken. Approval of department.*

Topics will be selected from taxonomic subsciences such as bacteriology, virology, protozoology, mycology, algology, and helminthology; and from transecting disciplines such as microbial genetics, immunology, physiology, and ecology.

### 999. *Doctoral Dissertation Research*

*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

## 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.

**A. Military Traditions—M S I**

*Winter. 0(0-1) Approval of department.*

**B. Advanced Drill and Ceremonies**

*Spring. 0(0-1) Approval of department or M S II standing.*

**C. Advanced Camp Preparation—M S III**

*Winter. 0(0-1) Approval of department or M S III standing.*

**D. Military Justice and Unit Administration**

*Fall. 0(0-1) Approval of department or M S IV standing.*

### *121. Preview of Military Science*

*Fall, Winter, Spring, Summer. 1(1-0) Approval of department.*

Role of the ROTC officer in the Army. Assists the student in planning a curriculum to satisfy requirements for a commission.

### *122. Marksmanship and Hunter Safety*

*Fall, Spring. 1(0-2) M S 121 or approval of department.*

Small arms marksmanship and safety. Practical exercises on local firing ranges. Individual basic military marksmanship and the skills necessary to participate in a competitive or recreational shooting program.

### *221. Fundamentals of Military Art and Tactical Science*

*Fall. 1(1-0) M S 121, M S 041A, M S 122.*

Contemporary military tactical doctrine, operations, principles of modern land warfare; analysis of historical examples, application of current doctrine to hypothetical situations.

### *223. Terrain Analysis and Land Navigation*

*Winter, Spring. 2(2-0) M S 121 and approval of department.*

Military topographic maps, special maps, map profiles, specifications and uses. Terrain analysis for military tactical operations. Land navigation with the lensatic and silva compass.

### *324. Military Teaching*

*Fall, Winter. 4(4-2) Basic course, approval of department.*

Methods of teaching manipulative skills to groups with varying educational backgrounds. Emphasis on determination of entry behavior, progress analysis, testing and test construction. Introduction to current teaching aids. Practical experience in simulated field situations is stressed during laboratory.

### *325. Military Management*

*Spring. 4(3-2) M S 324 or approval of department.*

Task analysis approach to missions. The subject of tactics is used as a teaching vehicle for the managerial approach to the preparation and exectution phases of military operations. Emphasis is placed on physical and moral leadership during the laboratory sections.

### *426. Military Law and Unit Administration*

*Fall. 2(2-0) Approval of department.*

Military legal system and the responsibilities of the commander and junior leaders in the application of military justice. Operation and administration in military units to provide personnel and logistic support.

### *427. Seminar*

*Spring. 2(2-0) Approval of department.*

Military professional ethics. Value inputs, reasoning, and decision making. Current military policies and trends as a pre-commission orientation.

### *499. Independent Study in Military Science*

*Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits. Approval of department and Juniors.*

Individual research and study in an area related to military science as approved and directed by the Department of Military Science.

# MUSIC MUS

## College of Arts and Letters

### *112. Chamber Music*

*Fall, Winter, Spring, Summer. 1(1-0) May reenroll for a maximum of 18 credits. Approval of department.*

Performance of works for small ensembles.

### *118. Band*

**A. Marching Band**

*Fall. 1 credit. May reenroll for credit. Membership determined by audition.*

The Marching Band participates at football games.

**B. Spartan Brass**

*Winter. 1 credit. May reenroll for credit. Membership determined by audition.*

The Spartan Brass participates at basketball games.

**C. Concert Band**

*Fall, Winter, Spring. 1 credit. May reenroll for credit. Membership determined by audition.*

Public appearances are scheduled on campus each term.

**D. Symphonic Band**

*Fall, Winter, Spring. 1 credit. May reenroll for credit. Membership determined by audition. A high level of achievement in performing ability is required.*

Concerts are scheduled both on and off campus.

**E. Wind Ensemble**

*Fall, Winter, Spring. 1 credit. May reenroll for a maximum of 12 credits. Membership determined by audition. The highest level of performance is required.*

Full range of wind literature is performed. Public concerts are presented both on and off campus.

**F. Repertory Band**

*Fall, Winter, Spring, Summer. 1 credit. May reenroll for a maximum of 12 credits. Membership determined by audition.*

Public appearances are scheduled on campus each term.

### *133A. Symphony Orchestra*

*(133) Fall, Winter, Spring. 1(0-5) May reenroll for a maximum of 12 credits. Admission by audition.*

Preparation and performance of symphony and operatic repertoire under direction of faculty and guest conductors of international reputation.

### *133B. Chamber Orchestra*

*Fall, Winter, Spring. 1(0-5) May reenroll for a maximum of 12 credits. Membership determined by audition.*

A specialized ensemble of advanced performers concentrating on the repertoire of the classic composers, and modern repertoire for chamber orchestra. Rehearsals and peformances with faculty and guest artists.

### *135. Music in Elementary Education*

*Fall, Winter, Spring, Summer. 4(3-3) Elementary education majors.*

Study of music learning strategies in the elementary schools. Music concepts and literature are developed through listening, performing, creative and analytical skills. Methods and materials are emphasized.

### *141. Class Instruments and Voice*

*Fall, Winter. 1(0-2) Knowledge of notation. Music majors, or approval of department.*

Class instruction in piano, voice, violin, cello, clarinet, and cornet.

### *142. Class Instruments and Voice*

*Winter, Spring. 1(0-2) MUS 141.*

Continuation of MUS 141.

### *143. Class Instruments and Voice*

*Spring. 1(0-2) MUS 142.*

Continuation of MUS 142.

### *147. Elementary Piano*

*Fall, Winter, Spring. 2(2-2) MUS 145 or approval of department. Elementary Education and Physical Education and Recreation majors.*

Beginning class piano instruction. Development of ability to play the three principal chords in all keys and to harmonize simple melodies using these chords. Transposition of simple melodies. Ability to play melodies and rhythms suitable for use in lower intermediate grades or in recreation work.

### *148. Elementary Piano*

*Winter, Spring. 2(2-2) MUS 147. Elementary Education majors.*

Continuation of MUS 147.

### *150. Keyboard Instruments and Harp*

*Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required.*

Instruction in piano, organ and harp.

### *151. Voice*

*Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required.*

### *152. Stringed Instruments*

*Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required.*

### *153. Woodwind Instruments*

*Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required.*

### *154. Brass Instruments*

*Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits.. Audition required.*

### *155. Percussion*

*Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required.*

### *180. Basic Harmony*

*Fall. 3(3-1)*

Fundamentals of basic musicianship: notation, clefs, scales, intervals, triads, meter, rhythm, and tonality. The analysis and writing of diatonic harmony in the style of the Bach 4-part chorale.