

- 200. Elementary Microbiology**
Fall, Winter. 4(3-2) N S 193. 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) N S 193. Primarily for Nursing students.
Survey of immunology and microbiology with emphasis on pathogenic microorganisms, antimicrobial agents, and laboratory diagnosis.
- 301. Introductory Microbiology**
Fall. 4(3-4) B S 212; BCH 200.
Fundamentals of microbiology with emphasis on the comparative nature of the various groups of microorganisms, their distribution and activities.
- 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 Work**
Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 12 credits. Approval of department.
Tutored reading and experimentation.
- 401. General Microbiology**
Fall. 5(5-0) B S 212; BCH 401 or concurrently.
Comparative biology of microorganisms: viruses, rickettsiae, bacteria, fungi, algae, and protozoa.
- 402. General Microbiology Laboratory**
Fall. 3(1-6) 401 or concurrently.
Laboratory based on the subject matter of 401.
- 413. General Virology**
(463.) Winter. 4(3-4) 427 or concurrently.
Physical, chemical, and biological properties of viruses; laboratory procedures employed for cultivation and identification of viruses.
- 416. General Parasitology**
(406.) Winter. Summer at W. K. Kellogg Biological Station. 3(2-4) B S 212.
Biology of parasitic animals.
- 421. Microbial Physiology**
(331.) Winter. 5(3-6) 401, 402.
Cell structure and function, growth and death, and metabolism of microorganisms.
- 423. Microbial Genetics**
(431.) Spring. 5(3-6) BCH 401; ZOL 441 recommended.
Fundamental genetic concepts as exemplified in microorganisms.
- 425. Microbial Ecology**
Summer. 6(3-9) 402. Given at W. K. Kellogg Biological Station.
Lecture emphasizes biological and biochemical properties of diverse naturally occurring microorganisms. The laboratory stresses the analysis and description of natural metabolic activity. Methodology includes enrichment techniques but also qualitative and quantitative monitors of environmental changes.
- 427. Immunobiology**
(460.) Winter. 5(3-6) B S 212; BCH 200 or BCH 401.
Biological and biochemical mechanisms of the immune response. Emphasis is on concepts of immunity and basic laboratory techniques.
- 429. Microbiology of Infectious Diseases**
(461.) Spring. 5(2-8) 301 or 402 and 427.
Biology, immunology, pathogenicity, and medical aspects of microorganisms associated with infectious diseases of man. Methods of isolation and identification are emphasized in the laboratory.
- 436. Introductory Medical Parasitology**
(309, 336.) Fall. 5(3-6) Primarily for Medical Technology students.
Biology and laboratory diagnosis of protozoan, helminth, and arthropod infections of man.
- 440. Food Microbiology**
(371.) Spring. 4(2-6) 200 or 301 or 401. Interdepartmental with and administered by the Food Science Department.
Major groups of microorganisms of importance to the food industry are studied with emphasis on ecological, physiological, and public health aspects.
- 442. Soil Microbiology**
(481.) Spring. 4(3-4) 200 or 301 or 401. Interdepartmental with the Soil Science Department.
Major groups of microorganisms of importance in soils are studied with emphasis on ecological, biochemical, and physical aspects.
- 444. Environmental Microbiology**
(351.) Spring. 3(2-4) 200 or 301 or 401.
Flora, methods of testing, and purification of environmental air and water. Treatment and disposal of sewage.
- 531. Medical Immunology and Microbiology**
(566.) Fall, Spring. 8 credits. Professional medical students or approval of department.
General immunology; comparative biology of microorganisms that have medical significance.
- 532. Veterinary Microbiology and Public Health**
(567.) Winter. Summer. 8(5-11) 531 or approval of department.
Biology, immunology, pathogenicity, and medical aspects of microorganisms associated with infectious diseases of animals. Epidemiology of animal diseases significant to human health.
- 536. Veterinary Parasitology I**
(501.) Winter, Summer. 4(3-4) Veterinary Medicine students or approval of department.
Distribution, biology, and control of parasitic animals of importance to veterinary medicine.
- 537. Veterinary Parasitology II**
(502.) Fall, Spring. 4(2-6) 536 or approval of department.
Continuation of 536.
- 800. Seminar**
(830.) Fall, Winter, Spring, Summer. 1(1-0).
816. **Parasitic Metazoa**
(802.) Spring of odd-numbered years. 4(3-4) 416 or ZOL 481 or approval of department.
Comparative biology, physiology, and host-parasite relationships of parasitic helminths and arthropods.
- 817. Parasitic Protozoa**
(803.) Spring of even-numbered years. 3(2-4) 416 or ZOL 482 or approval of department.
Comparative biology, physiology, and host-parasite relationships of parasitic protozoa.
- 826. Ecology of Animal Parasites**
Summer. 3 credits. 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(3-0) 427; 423, 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) 427; 827 or concurrently.
Laboratory based partially on subject matter of 827. Experimental techniques used in immunological assays and immune systems.
- 899. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 900. Topics in Microbiology**
Fall, Winter, Spring Summer. 2(2-0) May re-enroll 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.
- 901. Experimental Microbiology**
Fall, Winter, Spring, Summer. 3(0-9) May re-enroll for a maximum of 9 credits. Approval of department.
Experiments, demonstrations, and discussions of current research programs in various areas of microbiology.
- 999. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

MILITARY SCIENCE M S

All University

041. General Military Science
Fall, Winter, Spring. Zero credit. Approval of department.

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.

121. Preview of Military Science
Fall, Winter. 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) 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.

223. Terrain Analysis and Land Navigation

Winter, Spring. 3(3-0) 121 and approval of department.

Military maps, map construction, specifications and uses. Includes both a study of aerial photographs and an introduction to remote energy sensors employed by defense agencies as they relate to tactical operations.

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) 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 execution phases of military operations. Emphasis is placed on physical and moral leadership during the laboratory sections.

426. Military Law

Winter. 4(4-0) Approval of department.

Civilian and military law as they pertain to individuals and organizations associated with the Department of Defense.

427. Seminar

Spring. 1(1-0) Approval of department.

Precommissioning orientation stressing current military policies, procedures, customs and trends.

MUSIC

MUS

College of Arts and Letters

094. Band

Summer. Zero credit. Membership determined by audition.

Attendance at all rehearsals and public concerts obligatory. See Music 117, 118, 318.

100. Theory Review

Fall, Summer. 2(3-2) For majors who need theory review.

Basic course in fundamentals and ear training.

112. Chamber Music

Fall, Winter, Spring, Summer. 1(1-0)

118. Band

A. Marching Band.

Fall. 1 credit. May re-enroll for credit. Membership determined by audition.

The Marching Band participates at football games.

B. Spartan Brass

Winter. 1 credit. May re-enroll for credit. Membership determined by audition.

The Spartan Brass participates at basketball games.

C. Concert Band.

Fall, Winter, Spring. 1 credit. May re-enroll for credit. Membership determined by audition.

Public appearances are scheduled on campus each term.

D. Symphonic Band

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

Concerts are scheduled both on and off campus.

133. Orchestra

Fall, Winter, Spring. 1(0-5) Membership determined by audition.

Standard overtures and symphonies studied and publicly performed. Attendance at all rehearsals and public concerts obligatory.

135. Music in Elementary Education

Fall, Winter, Spring, Summer. 4(2-3)

Basis, scope and sequence of music instruction in the elementary schools with an introduction to basic knowledge and skills used in elementary school music.

141. Class Instruments and Voice

Fall. 1(0-2) Knowledge of notation.

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

142. Class Instruments and Voice

Winter. 1(0-2) 141.

Continuation of 141. Class instruction in piano, voice, violin, cello, clarinet, and cornet.

143. Class Instruments and Voice

Spring. 1(0-2) 142.

Continuation of 142. Class instruction in piano, voice, violin, cello, clarinet, and cornet.

145. Music Foundations

Fall, Winter, Spring, Summer. 4(3-2) Elementary Education and Physical Education and Recreation majors.

Development of understanding and knowledge of music fundamentals, ear training, and music reading; rhythm and tone problems.

146. Elements of Music

Fall, Winter, Spring. 2(1-2) Physical Education majors.

Understanding of music and rhythm necessary for the accompaniment and recognition of various rhythmic activities which are a part of physical education.

147. Elementary Piano

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

Continuation of 147.

150. Keyboard Instruments and Harp

Fall, Winter, Spring, Summer. 1 to 4 credits. To pass entrance examination, students should have all major and harmonic minor scales and arpeggios, and be able to play from memory equivalent of studies from Czerny Op. 299, two-part inventions of Bach, movements from Mozart, Haydn, or Beethoven sonatas, or compositions of equal difficulty.

Instruction in piano, pipe organ, and harp.

151. Voice

Fall, Winter, Spring, Summer. 1 to 3 credits. Some knowledge of piano is recommended. Candidates should possess a voice of good quality, and should show evidence of musicianship. During the entrance examination period (see University calendar) candidates for a major or a minor in voice should be prepared to sing three songs for the audition committee that will best show the candidate's vocal possibilities and musical development. Elective candidates need only to possess promising vocal quality and ability to read music.

152. Stringed Instruments

Fall, Winter, Spring, Summer. 2 to 4 credits. Student should have elementary knowledge of piano. Entering majors are expected to display a knowledge of instruments and play two-octave major and minor scales in the more common bowings.

Instruction in violin, viola, violoncello, and string bass.

153. Woodwind Instruments

Fall, Winter, Spring, Summer. 2 to 4 credits. Entering majors are expected to display playing knowledge of instrument to include proper voicing tone, knowledge of the less complicated alternate fingerings, and ability to play two-octave major and minor scales in the more common articulations.

Instruction in flute, oboe, clarinet, saxophone, and bassoon.

154. Brass Instruments

Fall, Winter, Spring, Summer. 2 to 4 credits. To pass entrance examination in a brass instrument, candidates should be able to meet the following requirements: proper embouchure, good tone quality, relatively accurate sense of pitch, rhythmic accuracy, fluent manner of playing, ability to play two-octave major scales in the more common keys, technical exercises equivalent to the major scale studies in the Arban Method, and solos such as Phantasy, Piece, Tuthil, My Regards, Llewellyn, Adagio Cantabile, Beethoven or other solos of equal difficulty.

Instruction in cornet, French horn, trombone, baritone, and tuba.

155. Percussion

Fall, Winter, Spring, Summer. 1 to 4 credits. To pass entrance examination in percussion instruments, candidate must be able to play satisfactorily the twenty-four rudiments.

180. Basic Harmony

Fall. 3(3-1)

Fundamentals of basic musicianship: notation, clefs, scales, intervals, triads, meter, rhythm,