

831. Bacterial Diversity
Spring of even-numbered years. 3(3-0)
MPH 303, MPH 304; BCH 401 or BCH 453 or
concurrently.

Morphological and physiological properties of diverse groups of bacteria and how these properties relate to their ecological niche and importance.

832. Bacterial Diversity Laboratory
Spring of even-numbered years. 2(0-6)
MPH 831 or concurrently.

Representative groups of bacteria will be isolated and studied.

842. Advanced Soil Microbiology
Fall of odd-numbered years. 3(3-0)
MPH 426 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.

Fundamental techniques of dealing with microorganisms indigenous 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. 2(2-0) May
reenroll for a maximum of 12 credits if different topics are 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

Office of the Provost

101. Introduction to the Military Profession
(M S 121.) Fall, Winter, Spring. 1(1-1)
Approval of department.

Analysis of the military profession from several academic perspectives. Exploration of the technical, ethical, and personal ramifications of service as an officer in the U.S. Army. Lab introduces military skills.

102. Military Leadership I
(M S 041A.) Winter. 1(1-1) M S 101 or
approval of department.

Introduction to military leadership. Draws upon examples from military history to illustrate what a military leader must be, know, and do to lead soldiers in battle. Lab includes both military skills and leadership applications.

103. Army Physical Fitness Training
Spring. 1(0-3) M S 102 or approval of
department.

The leader's role in implementing the Army Physical Fitness Program to provide for the physical well being of subordinates. Individual and group fitness programs are introduced. Includes rappelling and smallbore rifle marksmanship.

201. Military First Aid
(M S 221.) Fall. 1(1-1) M S 103 or
approval of department.

Emergency first aid techniques including casualty evaluation, lifesaving measures, CPR, and environmental injury prevention. Lab includes military skills and first aid applications.

202. Military Leadership II
(M S 041B.) Winter. 1(1-1) M S 201 or
approval of department.

Descriptive model of small unit leadership. Provides cadets with a realistic preview of the small unit leader's role in the Army. Lab includes small unit drill and ceremonies.

203. Land Navigation
(M S 223.) Spring. 1(1-2) M S 202 or
approval of department.

Use of military topographic and special use maps to include intersection, resection, modified resection, and polar coordinates. Development of overlays for tactical operations. Lab includes actual land navigation in the field using the lensatic compass.

301. Command and Control Communications
Fall. 3(2-3) M S 203 or approval of
department.

Tactical wire and radio communications systems and employment during tactical operations to provide effective control of military operations. Encryption/decryption, use of codes, and electronic warfare. Lab emphasizes practical application of communication skills.

302. Military Leadership III
Winter. 3(2-3) M S 301 or approval of
department.

Application of the theories and models of the behavioral sciences to leadership as it functions in a military environment. Case studies from military history. Lab emphasizes practical leadership applications.

303. Small Unit Tactics
(M S 325.) Spring. 3(2-3) M S 302 or
approval of department.

Offensive and defensive military tactics. Incorporates practical exercises which allow cadets to view the modern battlefield through the eyes of the infantry platoon leader. Lab emphasizes tactical employment of the infantry squad and platoon.

401. Training Management and Unit Administration
(M S 426.) Fall. 3(2-2) M S 303 or
approval of department.

The Army training management system and the leader's role as a trainer. Operations and administration in military units to provide effective personnel management and logistic support. Oral and written military communication. Lab includes practical experience in unit administration.

402. Military Leadership IV
(M S 041D.) Winter. 3(2-2) M S 401 or
approval of department.

Leadership assessment, development, and training practices. Integration of theory, practice, and self-assessment in leadership. Development of subordinates and the role of the noncommissioned officer. Lab includes leadership development and assessment exercises.

403. Military Law, Ethics, and Professionalism
(M S 427.) Spring. 3(2-2) M S 402 or
approval of department.

Military legal system and the responsibilities of leaders in the application of military justice. Examination of fundamental values and principles of conduct in the profession of arms. Lab includes practical exercises in professional development.

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 a maximum of 6 credits. Membership determined by audition.

The Marching Band participates at football games.

B. Spartan Brass
Winter. 1 credit. May reenroll for a maximum of 6 credits. Membership determined by audition.

The Spartan Brass participates at basketball and hockey games.

C. Concert Band
Fall, Winter, Spring. 1 credit. May
reenroll for a maximum of 12 credits. Membership determined by audition.

Public appearances are scheduled on campus each term.

D. Symphony Band
Fall, Winter, Spring. 1 credit. May
reenroll for a maximum of 12 credits. Membership determined by audition. A high level of achievement in performing ability is required.

Concerts are scheduled both on and off campus.

E. Wind Symphony
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. Campus Band
Fall, Winter, Spring. 1 credit. May
reenroll for a maximum of 12 credits. Open to all MSU students in any academic discipline.

Preparation for and participation in one concert.

**Descriptions — Music
of
Courses**

133A. Symphony Orchestra

Fall, Winter, Spring. 1(0-5) May reenroll for a maximum of 15 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 performances 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.

141A. Class Violin and Viola

(MUS 141.) Fall. 2(0-4) Knowledge of notation. Music majors, or approval of school. Class instruction in violin and viola.

141B. Class Percussion I

(MUS 340.) Fall. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in percussion.

141C. Class French Horn

(MUS 340.) Fall. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in French horn.

141D. Class Flute

(MUS 340.) Fall. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in flute.

141E. Class Oboe

(MUS 340.) Fall. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in oboe.

141F. Class Voice

(MUS 141.) Fall. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in voice.

141G. Class Piano

(MUS 141.) Fall, Winter. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in piano.

141J. Class Guitar

Fall, Winter. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in guitar.

142A. Class Cello and Stringed Bass

(MUS 142.) Winter. 1(0-2) MUS 141A. Class instruction in cello and stringed bass.

142B. Class Trumpet

(MUS 142.) Winter. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in trumpet.

142C. Class Trombone

(MUS 340.) Winter. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in trombone.

142D. Class Bassoon

(MUS 340.) Winter. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in bassoon.

142F. Class Voice

(MUS 142.) Winter. 1(0-2) MUS 141F. Continuation of MUS 141F.

142G. Class Piano

(MUS 142.) Winter, Spring. 1(0-2) MUS 141G. Continuation of MUS 141G.

142J. Class Guitar

Winter, Spring. 1(0-2) MUS 141J. Continuation of MUS 141J.

143A. Class Clarinet

(MUS 143.) Spring. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in clarinet.

143B. Class Tuba and Euphonium

Spring. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in tuba and euphonium.

143C. Class Percussion II

Spring. 1(0-2) Continuation of MUS 141B.

143D. Class Saxophone

Spring. 1(0-2) Knowledge of notation. Music majors or approval of school. Class instruction in saxophone.

143F. Class Voice

(MUS 143.) Spring. 1(0-2) MUS 142F. Continuation of MUS 142F.

143G. Class Piano

(MUS 143.) Spring. 1(0-2) MUS 142G. Continuation of MUS 142G.

143J. Class Guitar

Spring. 1(0-2) MUS 142J. Continuation of MUS 142J.

147. Elementary Piano

Fall, Winter, Spring. 2(2-2) Elementary Education, Physical Education and Exercise Science, and Health Education and Human Performance majors or approval of school.

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.

150A. Piano

(MUS 150.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required. Private instruction in piano.

150B. Organ

(MUS 150.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required. Private instruction in organ.

150C. Harp

(MUS 150.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 24 credits. Audition required. Private instruction in harp.

151. Voice

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

152A. Violin

(MUS 152.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in violin.

152B. Viola

(MUS 152.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in viola.

152C. Cello

(MUS 152.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in cello.

152D. Stringed Bass

(MUS 152.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in stringed bass.

152E. Guitar

Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in guitar.

153A. Flute

(MUS 153.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in flute.

153B. Oboe

(MUS 153.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in oboe.

153C. Clarinet

(MUS 153.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in clarinet.

153D. Saxophone

(MUS 153.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in saxophone.

153E. Bassoon

(MUS 153.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in bassoon.

154A. Trumpet

(MUS 154.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in trumpet.

154B. French Horn

(MUS 154.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in French horn.

154C. Trombone

(MUS 154.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in trombone.

154D. Euphonium.

(MUS 154.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in euphonium.

154E. Tuba.

(MUS 154.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 18 credits. Audition required. Private instruction in tuba.

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.

181. Basic Harmony

Winter. 3(3-1) MUS 180.

Continuation of MUS 180.

182. Basic Harmony

Spring. 3(3-1) MUS 181.

Continuation of MUS 181.

183. Aural Harmony

Fall. 1(0-2) MUS 180 concurrently.

The aural counterpart of basic harmony. Drill in harmonic, melodic and rhythmic dictation. Sight singing and keyboard harmony.

184. Aural Harmony

Winter. 1(0-2) MUS 183; MUS 181 concurrently.

185. Aural Harmony

Spring. 1(0-2) MUS 184; MUS 182 concurrently.

189. Collegiate Choir

Fall, Winter, Spring. 1(0-3) May reenroll for a maximum of 12 credits. Membership determined by audition.

Three hours of choral rehearsals each week. Representative literature for mixed choir with emphasis on Renaissance, Baroque, Classical, Romantic, and contemporary composers. Attendance at all rehearsals and performances obligatory.

190. State Singers

Fall, Winter, Spring. 1(0-4) May reenroll for a maximum of 12 credits. Membership determined by audition; ability to sight read.

Four hours of rehearsals a week. Attendance at all rehearsals and public performance obligatory.

191. Choral Union

Fall, Winter, Spring, Summer. 1(0-2-1/2) May reenroll for a maximum of 12 credits. Membership determined by audition.

Two and one-half hours of rehearsals per week. Attendance at all rehearsals and public concerts obligatory.

192. Glee Club, Men and Women

Fall, Winter, Spring. 1(0-3) May reenroll for a maximum of 12 credits.

Three hours of rehearsals a week. Attendance at all rehearsals and public concerts obligatory.

193. University Chorale

Fall, Winter, Spring. 1(0-4) May reenroll for a maximum of 12 credits. Membership determined by audition.

Choral ensemble designed primarily for graduate and upper class undergraduate students. Representative literature for chamber chorale with emphasis on Renaissance, Baroque, and contemporary composers.

195. Jazz Laboratory Band

Fall, Winter, Spring, Summer. 1(0-4) May reenroll for a maximum of 12 credits. Membership determined by audition.

Practical experience in playing music in the jazz idiom. Techniques of rehearsing a stage band. Playing of student arrangements; performance of jazz composition and arrangements in concert.

196. Jazz Combo Performance

Fall, Winter, Spring. 1(0-3) May reenroll for a maximum of 12 credits. Audition.

Small group playing experience for advanced performers and improvisors, with additional emphasis on the writing of arrangements for the group.

200H. Honors Work

Fall, Winter, Spring, Summer. 1 to 16 credits. May reenroll for a maximum of 16 credits. Approval of department.

208. Basic Keyboard Tuning: Theory and Practice I

Fall, Summer. 2(2-2). MUS 182, MUS 185 or approval of department.

Basic acoustics. Historical development of musical scales and tuning systems. Classical and modern methods of keyboard tuning.

209. Basic Keyboard Tuning: Theory and Practice II

Winter. 2(1-3) MUS 208.

Continuation of MUS 208.

210. Basic Keyboard Tuning: Theory and Practice III

Spring. 2(1-3) MUS 209.

Continuation of MUS 209.

211. Introduction to Music Literature I (A)

Fall. 4(4-0) Student may not receive credit in both HUM 261 and MUS 211.

Comparative study of selected musical works in historical context with emphasis on their relationships to society in general and the other arts in particular. From Antiquity through the Renaissance.

212. Introduction to Music Literature II (A)

Winter. Summer of odd-numbered years. 4(4-0) Student may not receive credit in both HUM 262 and MUS 212.

Comparative study of selected musical works in historical context with emphasis on their relationships to society in general and the other arts in particular. From 1600 to 1800.

213. Introduction to Music Literature III (A)

Spring. Summer of even-numbered years. 4(4-0) Student may not receive credit in both HUM 263 and MUS 213.

Comparative study of selected musical works in historical context with emphasis on their relationships to society in general and the other arts in particular. From Beethoven to the present.

224. History of Music

Fall. 3(3-0) MUS 183.

Music from ancient Greece through Romanesque and Gothic periods, concluding with the Renaissance. Greek theory and "ethos"; age of plainsong; development of polyphony; instruments peculiar to period under question.

225. History of Music

Winter. 3(3-0) MUS 224.

Baroque and classical periods. Special attention to fugue, opera, oratorio, sonata, and symphony. Analysis of characteristic works.

226. History of Music

Spring. 3(3-0) MUS 225.

Romantic period, impressionism, and contemporary trends. Continuation of development of form, melody, rhythm, and tonality.

231. Beginning Jazz Improvisation I

(MUS 234.) Fall. 2(2-0) MUS 182 or approval of school.

Fundamentals of chord-scale relationships, basic forms, style, with emphasis on major key II-V-I progression.

232. Beginning Jazz Improvisation II

Winter. 2(2-0) MUS 231 or approval of school.

Continuation of MUS 231 with emphasis on minor key II-V-I progression and blues.

233. Beginning Jazz Improvisation III

Spring. 2(2-0) MUS 232 or approval of school.

Continuation of MUS 232 with emphasis on more complex forms using II-V-I progressions in major and minor, and altered blues forms.

241. Advanced Class Piano

Fall. 1(0-2) MUS 143G or approval of school. For Vocal-General Music Education majors only.

Continuation of Class Piano MUS 143G. Special emphasis given to developing practical skills at the piano for use in the public school classroom.

242. Advanced Class Piano

Winter. 1(0-2) MUS 241 or approval of department.

Continuation of MUS 241.

Descriptions — Music

of Courses

- 243. Advanced Class Piano**
Spring. 1(0-2) MUS 242 or approval of department.
Continuation of MUS 242.
- 245. Music in Special Education**
Fall, Winter, Spring, Summer. 3(3-0) MUS 135. Special education majors.
Methods of teaching music in special education programs.
- 250. Introduction to Music Education**
Fall, Spring. 2(2-1) Sophomores in Music Education or approval of department.
An overview of the field of school music. Study and discussion of historical background, current trends, and teaching responsibilities at all curricular levels.
- 251. German Diction for Singers**
Fall. 1(1-1) Three terms of MUS 151.
Practice and training in German lyric diction. Rules of pronunciation; emphasis on spoken drill and performance of German art songs in class.
- 252. French Diction for Singers**
Winter. 1(1-1) Three terms of MUS 151.
Practice and training in French lyric diction. Rules of pronunciation. Emphasis on spoken drill and performance of French art songs in class.
- 275. Popular Music Styles**
Winter. 3(3-0)
Style characteristics of prominent genres of popular music in twentieth century America. The evolution of popular musical taste.
- 276. Popular Music Styles**
Spring. 3(3-0)
A survey of style characteristics of prominent genres of popular music in the United States from 1950 to the present.
- 280. Advanced Harmony**
Fall. 3(3-1) MUS 182.
Continuation of MUS 182, with added vocabulary and technique through nineteenth century harmony. Creative writing in small forms.
- 281. Advanced Harmony**
Winter. 3(3-1) MUS 280.
Continuation of MUS 280.
- 282. Advanced Harmony**
Spring. 3(3-1) MUS 281.
Continuation of MUS 281.
- 283. Advanced Aural Harmony**
Fall. 1(0-2) MUS 185; MUS 280 concurrently.
Aural counterpart of advanced harmony. Drill in harmonic, melodic, and rhythmic dictation. Sight singing and keyboard harmony.
- 284. Advanced Aural Harmony**
Winter. 1(0-2) MUS 283; MUS 281 concurrently.
- 285. Advanced Aural Harmony**
Spring. 1(0-2) MUS 284; MUS 282 concurrently.
- 308. Advanced Keyboard Tuning: Theory and Practice I**
Fall. 3(2-2) MUS 210 or approval of department.
History of piano construction including physics of action and string measurements. Practice action regulation and minor repairs. Concert tuning and tone regulation.
- 309. Advanced Keyboard Tuning: Theory and Practice II**
Winter. 3(2-2) MUS 308.
Continuation of MUS 308.
- 310. Advanced Keyboard Tuning: Theory and Practice III**
Spring. 3(2-2) MUS 309.
Continuation of MUS 309.
- 320. Music Workshop**
Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.
- 328. Composing and Arranging for Jazz Ensemble I**
(MUS 334.) Fall. 3(3-0) MUS 182; approval of school.
Techniques of orchestration, chord progressions, voicings, forms, and part/score writing for contemporary jazz ensemble. Analysis of recordings and scores.
- 329. Composing and Arranging for Jazz Ensemble II**
Winter. 3(3-0) May reenroll for a maximum of 6 credits. MUS 328 or approval of school.
Techniques of composition for large jazz ensemble.
- 330. Jazz in America**
Spring. 3(3-0) Juniors or approval of department.
Jazz fundamentals, history, styles, and social significance.
- 331. Advanced Jazz Improvisation I**
Fall. 2(2-0) MUS 233 or approval of school.
Continuation of MUS 233. Emphasis on continued proficiency of jazz skills. Introduction of pentatonic scale, resources for all chord types.
- 332. Advanced Jazz Improvisation II**
Winter. 2(2-0) MUS 331 or approval of school.
Continuation of MUS 331. Emphasis on continued proficiency of pentatonic scales, introduction of several new scale sources and patterns. Piano chord voicings.
- 333. Advanced Jazz Improvisation III**
Spring. 2(2-0) MUS 332 or approval of school.
Continuation of MUS 332. Emphasis on chromatic motive development and nontraditional improvisation, i.e. solo improvisation, atonal improvisation, and unusual instrument combinations.
- 335. Ensemble and Conducting**
Fall, Spring. 3(1-4) MUS 185 or approval of department.
Principles of conducting correlated with application in ensemble of vocal and instrumental class instruction. Survey of vocal and instrumental ensemble literature suitable for school use. Individual conducting stressed.
- 336. Ensemble and Conducting**
Winter. 3(1-4) MUS 335.
Continuation of MUS 335.
- 345. Teaching Music in the Elementary School I**
Fall, Winter, Spring, Summer. 3(3-0) Approval of department.
Procedures and program of music instruction in the elementary school. Special emphasis on instructional problems of early elementary children.
- 347. Methods and Literature**
Fall. Summer of odd-numbered years. 2(1-2) Six terms of study on applied instrument or voice, or approval of department.
Methods of teaching voice or instruments. Study of appropriate teaching literature.
- 348. Methods and Literature**
Winter. 2(1-2) Six terms of study on applied instrument or voice, or approval of department.
Methods of teaching voice or instruments. Study of appropriate literature.
- 349. Methods and Literature**
Spring. Summer of even-numbered years. 2(1-2) Six terms of study on applied instrument or voice, or approval of department.
Methods of teaching voice or instruments. Study of appropriate teaching literature.
- 350A. Piano**
(MUS 350.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 150A or approval of school.
Private instruction in piano.
- 350B. Organ**
(MUS 350.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 150B or approval of school.
Private instruction in organ.
- 350C. Harp**
(MUS 350.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 150C or approval of school.
Private instruction in harp.
- 351. Voice**
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 151 or approval of department.
Continuation of MUS 151.
- 352A. Violin**
(MUS 352.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 152A or approval of school.
Private instruction in violin.
- 352B. Viola**
(MUS 352.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 152B or approval of school.
Private instruction in viola.
- 352C. Cello**
(MUS 352.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 152C or approval of school.
Private instruction in cello.

352D. Stringed Bass

(MUS 352.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 152D or approval of school.

Private instruction in stringed bass.

352E. Guitar

Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 21 credits. Six terms of MUS 152E or approval of school.

Private instruction in guitar.

353A. Flute

(MUS 353.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 153A or approval of school.

Private instruction in flute.

353B. Oboe

(MUS 353.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 153B or approval of school.

Private instruction in oboe.

353C. Clarinet

(MUS 353.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 153C or approval of school.

Private instruction in clarinet.

353D. Saxophone

(MUS 353.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 153D or approval of school.

Private instruction in saxophone.

353E. Bassoon

(MUS 353.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 153E or approval of school.

Private instruction in bassoon.

354A. Trumpet

(MUS 354.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 154A or approval of school.

Private instruction in trumpet.

354B. French Horn

(MUS 354.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 154B or approval of school.

Private instruction in French horn.

354C. Trombone

(MUS 354.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 154C or approval of school.

Private instruction in trombone.

354D. Euphonium

(MUS 354.) Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 154D or approval of school.

Private instruction in euphonium.

354E. Tuba

(MUS 354.) Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 154E or approval of school.

Private instruction in tuba.

355. Percussion

Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 24 credits. Six terms of MUS 155 or approval of department.

Continuation of MUS 155.

356. Piano Sight Reading and Accompanying

Fall, Winter, Spring. 2(0-4) May reenroll for a maximum of 12 credits. Piano major or approval of department.

Sight reading. Transposing. Under supervision accompanying instrumental and vocal soloists.

357. Piano Accompanying

Fall, Winter, Spring. 1(0-5) May reenroll for a maximum of 12 credits. Piano major or approval of instructor.

Instruction in the art of accompaniment. Accompaniment of instrumental and vocal soloists.

380. Studies in Style and Form

Fall, Summer. 2(2-1) MUS 282.

Analysis and creative writing of technical and structural practices in music of various periods, with special emphasis on the twentieth century.

381. Studies in Style and Form

Winter, Summer. 2(2-1) MUS 282.

Analysis and creative writing of technical and structural practices in music of various periods, with special emphasis on the twentieth century.

382. Studies in Style and Form

Spring, Summer. 2(2-1) MUS 282.

Analysis and creative writing of technical and structural practices in music of various periods, with special emphasis on the twentieth century.

383. Orchestration

Fall, Summer. 2(2-0) MUS 282.

Modern orchestral resources and scoring for various instrumental groups.

384. Orchestration

Winter, Summer. 2(2-0) MUS 383.

Continuation of MUS 383.

385. Orchestration

Spring, Summer. 2(2-0) MUS 384.

Continuation of MUS 384.

386. Counterpoint

Fall of even-numbered years. 2(2-0) MUS 282.

Creative and analytical work with two-part counterpoint in the style of J. S. Bach.

387. Counterpoint

Winter of odd-numbered years. 2(2-0) MUS 386.

Creative and analytical work with three-part counterpoint in the style of J. S. Bach.

388. Counterpoint

Spring of odd-numbered years. 2(2-0) MUS 387.

Creative and analytical work with three and four-part counterpoint in the style of J. S. Bach.

400. Clinical Training in Music Therapy

Fall, Winter, Spring, Summer. 1 to 16 credits. Music therapy majors.

Six months internship in an accredited neuropsychiatric hospital.

400H. Honors Work

Fall, Winter, Spring, Summer. 1 to 16 credits. May reenroll for a maximum of 16 credits. Approval of department.

408. Piano Technology I

Fall. 3(2-2) MUS 310 or approval of department.

Methods of and practice in restoring the original tone of old pianos. Repairing or replacing all worn parts. Advanced concert tuning and tone regulation.

409. Piano Technology II

Winter. 3(2-2) MUS 408.

Continuation of MUS 408.

410. Piano Technology III

Spring. 3(2-2) MUS 409.

Continuation of MUS 409.

411. Opera

Winter of odd-numbered years. 2(1-2) Six terms of voice or approval of department.

History of opera from 1600 to the present.

412. Oratorio

Fall of even-numbered years. Summer. 2(1-2) Six terms of voice or approval of department.

History of oratorio from 1600 to the present.

415A. Renaissance Music

Fall. 2 credits. MUS 182 or approval of department.

415B. 19th Century Music

Fall. 2 credits. MUS 182 or approval of department.

415C. Keyboard Music, Seventeenth through Eighteenth Centuries

Fall of even-numbered years. 2 credits. MUS 182 or approval of department.

415E. German Lieder

Fall of odd-numbered years. 2 credits. MUS 182 or approval of department.

415F. Organ Literature to 1700

Fall of odd-numbered years. 2 credits. MUS 182 or approval of department.

416A. Baroque Music

Winter. 2 credits. MUS 182 or approval of department.

416B. Twentieth Century Music, European

Winter. 2 credits. MUS 182 or approval of department.

416C. Piano Music, Nineteenth Century

Winter of odd-numbered years. 2 credits. MUS 182 or approval of department.

416E. French-Italian Art Song

Winter of even-numbered years. 2 credits. MUS 182 or approval of department.

417A. Classical Music

Spring. 2 credits. MUS 182 or approval of department.

417B. American Music

Spring. 2 credits. MUS 182 or approval of department.

**Descriptions — Music
of
Courses**

- 417C. Piano Music, Twentieth Century**
Spring of odd-numbered years. 2 credits. MUS 182 or approval of department.
- 417E. English-American Art Song**
Spring of even-numbered years. 2 credits. MUS 182 or approval of department.
- 417F. Organ Literature From 1900 to Present**
Spring of even-numbered years. 2 credits. MUS 182 or approval of department.
- 421. Music and Worship**
Fall. 3(3-0) MUS 226 or approval of department.
Relationship of music and liturgy to Christian worship. Traditional liturgies and forms of service of the Christian churches with emphasis on function and place of music in worship.
- 430. Marching Band Methods and Materials**
Winter. 2(2-0) Music Education Juniors or approval of instructor.
Basic marching techniques, show development, charting techniques, use of accessory groups, and appropriate materials for high school marching band.
- 431. Computers in School Music**
Spring. 2(2-0) Music Education juniors.
Techniques and principles of computer-assisted instruction of music in school programs. Emphasis on appropriate hardware and software for teaching management.
- 434. Aesthetic Theory and Modernism**
Fall. 4(4-0) Juniors. Interdepartmental with History of Art, Linguistics and Oriental and African Languages, Romance Languages, and the departments of English and Philosophy. Administered by the Department of Philosophy.
Problems, assumptions, and arguments of modern aesthetic theory examined in the context of debates over modernity and modernist artistic practice.
- 435. Advanced Conducting**
Spring, Summer. 2(2-0) Approval of department.
Development of conducting skills through rehearsals and analysis of literature appropriate for secondary school performing ensembles.
- 438. Brass and Woodwind Techniques**
Spring, Summer. 2(1-2) Senior music majors.
Materials and contemporary pedagogical practices of group wind instrumental instruction.
- 439. Electronic and Computer Music Literature**
Fall, Summer. 2(2-0) MUS 282 or approval of school.
Music literature composed with tape recorders, synthesizers, and computers, 1950 to present.
- 440. Introduction to Electronic Music Composition**
Fall, Summer. 2(2-0) MUS 282 or approval of school.
Audio recording and processing techniques; tape manipulation techniques; signal generating and processing modules of analog, voltage-controlled synthesis; compositional techniques of musique concrete and electronic synthesis.
- 441. Introduction to Computer Music Composition**
Spring, Summer. 2(1-2) MUS 282 or approval of school.
Digital synthesizers; MIDI; computer sequencing and librarian software; and compositional techniques of computer music.
- 442. Independent Projects in Electronic and Computer Music Composition**
Fall, Winter, Spring, Summer. 2 credits. May reenroll for a maximum of 6 credits. MUS 441 or MUS 871 or approval of school.
Independent compositional work and assigned use of the Electronic and Computer Music Studio.
- 450. Recreational Music**
Spring, Summer of odd-numbered years. 2(2-0) Majors.
Organization and administration of a community music program for adults; community chorus, orchestra, and band. Nonsymphonic instruments and their use in recreation. Summer camp and playground music. Recreational music as it is organized and used by industries.
- 462. Studio Teaching and Observation**
Fall. 2(1-2) MUS 347, MUS 348, MUS 349.
Supervised studio teaching in classes and private lessons plus one-hour seminar each week.
- 463. Studio Teaching and Observation**
Winter. 2(1-2) MUS 462.
Continuation of MUS 462.
- 464. Studio Teaching and Observation**
Spring. 2(1-2) MUS 463.
Continuation of MUS 463.
- 470. Influence of Music on Behavior**
Fall. 3(3-0) Nine credits of psychology or approval of department.
Study of the physiological and psychological effects of music; relation of music to health. Experimental studies, related philosophical and psychological theory will be reviewed.
- 471. Music Therapy Techniques**
Winter. 3(3-0) MUS 470.
Survey of procedures in music therapy; investigation of the rise of music as a tool in treatment of mentally ill, mentally and physically handicapped; introduction to hospital organization.
- 472. Music Therapy Techniques**
Spring. 3(3-0) MUS 471.
Continuation of MUS 471.
- 483. Composition**
Fall, Winter, Spring, Summer. 2(2-0) May reenroll for a maximum of 18 credits. MUS 282 or approval of department.
Guided projects in creative writing.
- 486. Psychology of Music**
Fall, Summer. 3(3-0) Approval of department. Interdepartmental with and administered by the Department of Psychology.
Musical behavior with emphasis on psychological aspects of perception, learning, affective response, and ability. Emphasis on social and cultural influences in forming musical tastes, including mass media music.
- 487. Psychology of Music**
Winter, Summer. 3(2-2) PSY 486 or approval of department. Interdepartmental with and administered by the Department of Psychology.
Basic research concepts and experimental methods in psychology of music research. Practical training in conducting experimental research of musical behavior.
- 490. Independent Study: Special Problems in Music Research**
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Seniors or approval of department.
Individual problems in music research.
- 495. Opera Workshop**
Fall, Winter, Spring. 1 to 2 credits. May reenroll for a maximum of 6 credits. Approval of department.
Practical experience in performance and production of opera and opera scenes.
- 499. Special Topics**
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll for a maximum of 10 credits if a different topic is taken. Juniors, or approval of department.
Offered on an experimental basis according to instructor availability and student interest.
- 802. Seminar in History of Music**
Summer. 4(5-0) May reenroll for a maximum of 12 credits. Approval of department.
Critical study in depth of music literature and performance practices within historical perspective.
- 803. Seminar in Music Education**
Spring of odd-numbered years, Summer of even-numbered years. 3(3-0) Approval of department.
Consideration of the historical and philosophical basis for music instruction in education.
- 804. Seminar in Music Learning**
Fall, Summer. 3(3-0) Approval of department.
Detailed analysis of the conditions of music learning for teachers of music including consideration of perception, maturation and concept formation.
- 805. Seminar in Music Curriculum**
Winter, Summer. 3(3-0) Approval of department.
Development of goals, objectives, learning sequence and evaluative techniques for music learning at all instructional levels.
- 806. Seminar in Music Education Methodology**
Spring of even-numbered years; Summer of odd-numbered years. 3(3-0) Approval of department.
Critical analysis of various methodologies in music teaching. Emphasis on the impact of methods and their applications to improvement of musical growth in performance, cognitive, and affective domains.
- 811. Introduction to Research in Music Education and Music Therapy**
Fall, Summer. 3(3-0) Approval of department.
Conducting and critically interpreting research in music education and music therapy. Library skills, experimental research, and statistical analysis are emphasized.

- 812. Research Problems in Music**
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 15 credits.
- 813. Chamber Music**
Fall, Winter, Spring, Summer. 1(1-0)
May reenroll for a maximum of 6 credits. Approval of department.
Performance of works for small ensembles.
- 817. Seminar in Chamber Music: 20th Century**
Spring. 2(2-0) Approval of department.
Intensive study of selected chamber music works of the 20th century.
- 820. Music Workshop**
Summer. 1 to 9 credits. May reenroll for a maximum of 9 credits. Approval of department.
- 821. Advanced Methods and Materials in Elementary Music**
Fall, Winter, Spring, Summer. 3(3-0)
May reenroll for a maximum of 9 credits if different topics are taken. Graduate students in Music Education or approval of department.
Teaching methods and materials for special topics in elementary music, such as music literature, Orff, Kodaly, and integrated arts.
- 824. Research Methods and Materials**
Fall. 3 or 4 credits.
A critical examination of encyclopedias, indices, and other aids to research, and of the organization, presentation and documentation of research results.
- 830. Sixteenth Century Counterpoint**
Fall of even-numbered years, Summer. 3(3-0) Approval of school.
Study and writing of counterpoint based upon the works of Orlando Lasso and Palestrina.
- 831. Sixteenth Century Counterpoint**
Winter of odd-numbered years, Summer. 3(3-0) MUS 830.
Continuation of MUS 830.
- 834. Seminar in Composition**
Fall, Winter, Spring, Summer. 2(2-0)
May reenroll for a maximum of 24 credits. Approval of department.
Study of contemporary music with emphasis on compositional procedures.
- 835. Composition**
Fall, Winter, Spring, Summer. 1 to 2 credits. May reenroll for a maximum of 24 credits. Approval of department.
Advanced composition.
- 836. Seminar in Conducting**
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 18 credits. Approval of department.
Advanced conducting techniques applicable to choral and instrumental music of all periods.
- 843. Pedagogy of Theory**
Fall, Summer. 3(3-0) Approval of department.
Methods, content, and textbooks for teaching basic theory.
- 844. Pedagogy of Theory**
Winter, Summer. 3(3-0) Approval of department.
Continuation of MUS 843 with emphasis upon new instructional media, and upon methods and materials in ear training and sight singing.
- 846. Minor Instrument Study: String**
Fall, Winter, Spring, Summer. 1(1-0)
May reenroll for a maximum of 12 credits.
Secondary instrument for students enrolled in string specialist program.
- 847. Minor Instrument Study: Brass**
Fall, Winter, Spring, Summer. 1(1-0)
May reenroll for a maximum of 12 credits.
Secondary instrument for students enrolled in brass specialist program.
- 848. Minor Instrument Study: Woodwinds**
Fall, Winter, Spring, Summer. 1(1-0)
May reenroll for a maximum of 12 credits.
Secondary instrument for students enrolled in woodwind specialist program.
- 849. Minor Instrument Study: Piano**
Fall, Winter, Spring, Summer. 1(1-0)
May reenroll for a maximum of 12 credits. Approval of department.
Study of piano for students in majors other than applied music.
- 850. Applied Music**
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 27 credits.
- 851. Minor Instrument Study: Voice**
Fall, Winter, Spring, Summer. 1(1-0)
May reenroll for a maximum of 12 credits. Approval of department.
Study of vocal techniques for students in majors other than applied music.
- 852. Choral Technique and Materials**
Spring, Summer. 3(3-0) May reenroll for a maximum of 9 credits. Completion of undergraduate program in music education.
Advanced course for further development of choral proficiency. Demonstrations of choral techniques, conducting by students, examination and evaluation of new materials.
- 860. Problems in Analysis**
Summer. 4(4-0) May reenroll for a maximum of 8 credits. Approval of department.
An application of analytical procedures to school music repertoire.
- 870. Composition with Computers**
Winter. 2(2-0) MUS 834 or approval of school.
Techniques and principles of composition with computers. Use of computer equipment and software.
- 871. Computer Music Projects**
Spring. 1 to 3 credits. May reenroll for a maximum of 12 credits. MUS 870, MUS 964, or approval of school.
Music theory and composition projects using computer equipment and software.
- 875. Computer Aided Instruction in Music Theory**
Spring. 2(2-0) MUS 844 or approval of school.
Problems of design, implementation, and evaluation of college-level computer aided instruction software in music theory.
- 880. Materials of Music**
Fall, Winter, Summer. 1 to 4 credits. MUS 282.
Correlation of the areas of music theory as a basis for the study of 19th and 20th century music.
- 881. Materials of Music**
Winter, Spring. 1 to 4 credits. MUS 880.
Continuation of MUS 880.
- 899. Master's Thesis Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 903. Proseminar in Music Education**
Fall, Winter, Spring, Summer. 3(3-0)
May reenroll for a maximum of 9 credits. Approval of department.
Problems of music education with study of and readings from aesthetics, philosophy, measurement evaluation, and teacher training.
- 915. Medieval Music**
Fall. 3(3-0) Approval of department.
Investigation of various developments in European music to middle of fifteenth century. Some attention given to Gregorian Chant as well as to various types of secular Monody, but greater stress is laid on the forms and styles of Polyphonic music.
- 916. Renaissance Music**
Winter. 3(3-0) Approval of department.
Investigation of developments in European music from 1450 to 1600, tracing developments in both sacred and secular music.
- 917. Music of the 17th Century**
Spring. 3(3-0) Approval of department.
Instrumental and vocal music of Early Baroque period.
- 918. Music of the 18th Century**
Fall. 3(3-0) Approval of department.
Intensive study of selected topics in 18th century music.
- 919. Music of the 19th Century**
Winter. 3(3-0) Approval of department.
Intensive study of selected topics in 19th century music.
- 920. Music of the 20th Century**
Spring. 3(3-0) Approval of department.
Intensive study of selected topics in 20th century music.
- 924. Seminar in Musicology**
Spring. 3 credits. May reenroll for a maximum of 15 credits. Approval of school.
- 943. Survey of the History of Theory**
Winter. 2(2-0) Approval of department.
Significant theoretical treatises from the 6th century B. C. to the early 20th century.
- 954. Administration of Music Education Programs**
Spring of even-numbered years. 3(3-0) Approval of department.
Techniques for administering school music and higher education music programs.

Descriptions — Music

of Courses

955. **Current Tendencies in Music Education**
Winter of even-numbered years. 3(3-0)
Approval of department.
Current trends and practices in public school music education.
956. **Advanced Research Techniques in Music**
Winter. 3(3-0) Approval of department.
Selected research techniques in music education with emphasis on experimental design and computerized data analysis.
960. **Analytical Studies**
Fall. 3(3-0) Approval of department.
Analysis of melody, harmony, rhythm, color, texture, counterpoint, and form in part-music from the thirteenth century through the late sixteenth/early seventeenth century.
961. **Analytical Studies**
Winter. 3(3-0) Approval of department.
Analysis of melody, harmony, rhythm, color, texture, counterpoint, and form in music from the late seventeenth/early eighteenth century through the nineteenth century.
962. **Analytical Studies**
Spring. 3(3-0) Approval of department.
Analysis of melody, harmony, rhythm, color, texture, counterpoint, and form in music of the twentieth century.
963. **Schenker Analysis**
Winter. 2(2-0) Approval of school.
Analytical techniques and concepts of Heinrich Schenker. Examination of his sketches and writings, reading about him, and analysis of music using his techniques.
964. **Set-Theory Analysis of Atonal Music**
Fall. 2(2-0) Approval of school.
Set-Theory principles and their application to the analysis of atonal music.
970. **Contrapuntal Techniques**
Fall of odd-numbered years, Summer. 3(3-0) Approval of school.
Advanced contrapuntal practice from the sixteenth century to the present.
971. **Contrapuntal Techniques**
Winter of even-numbered years, Summer. 3(3-0) MUS 970.
Continuation of MUS 970.
972. **Contrapuntal Techniques**
Spring of even-numbered years, Summer. 3(3-0) MUS 971.
Continuation of MUS 971.
999. **Doctoral Dissertation Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

NATURAL SCIENCE N S

College of Natural Science

115. **The Nature and Continuity of Life (N)**
Fall, Winter, Spring, Summer. 4(3-2)
Not open to students with credit in N S 1814.
A—The development and testing of scientific concepts as examples of our attempts to understand the world. Selected topics from the life sciences illustrate the nature of scientific investigation.
B—Theories of the origin, development and structure of life and the universe of which it is a part. Examination of contemporary problems associated with defining life and death.
C—Consideration of social and ethical issues relating to our increasing control of reproduction and heredity. Reproduction and heredity from molecular, cellular and organismic perspectives, including human structure and function.
D—The nature of living things, contrasting various scientific and non-scientific views. The implications of the modern scientists understanding of life for our beliefs and values.
122. **Human Biosocial Evolution (N)**
Fall, Winter, Spring. 4(3-2)
Current understanding of human beings and their beliefs as products of biological and cultural evolution. Implications for the future of humanity.
125. **Time and Change in Nature (N)**
Fall, Winter, Spring, Summer. 4(3-2)
Not open to students with credit in N S 1824.
A—Our attempts to explain the present in terms of past events are explored through selected topics from the life sciences and earth sciences. Stresses the role of controversy in science and the nature of scientific evidence.
B—Heredity, evolution and diversity of life are examined from the viewpoint of the biological and cultural development of the human species. Evolutionary relationships between humans and their environment.
C—The origin and evolution of earth and living things are studied as vital and related problems. Emphasis on problem-solving in science and impact of evolutionary concepts on human societies.
129. **Biotechnology and Human Values (N)**
Winter, Spring. 4(4-0)
Consideration of social and ethical issues which arise from our increasing control of the human body through biotechnology.
135. **Changing Concepts of the Universe (N)**
Fall, Winter, Spring, Summer. 4(3-2)
Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229, N S 135, N S 155 or N S 1834.
A—The origin and development of scientific explanations of the physical world. The origins of modern science and scientific revolutions.
B—The role of science in the development of western ideas about reality. The origin and development of mechanistic concepts of the physical world and their part in intellectual dialogue.
C—Growth of theories of celestial motion and of matter. Their interrelationship. Impact of scientific knowledge on society. The contribution of science to clarification and solution of social problems.

142. **Life, Its Environment (N)**
Fall, Winter, Spring. 4(3-2)

Natural ecological systems and the impact of human biological and cultural development on them. Examination of specific ecological problems and the role of science in seeking solutions.

152. **Science and Culture in the 20th Century (N)**
Fall, Winter, Spring. 4(4-0)

Controversies concerning interpretation of modern scientific concepts such as evolution, uncertainty and relativity are discussed in terms of developing a personal philosophy.

155. **Cosmology, Humanity's Place in the Universe (N)**
Fall, Winter, Spring, Summer. 4(3-2)
Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229, N S 135, N S 155, N S 1834.

Our attempts to understand the universe and our place within it. The interaction between scientific concepts and the beliefs and values of the culture in which they are proposed.

162. **Race, The Evolution of an Idea (N)**
Fall, Winter, Spring. 4(3-2) N S 115 or approval of department.

Human races and evolution. The biological concept of race based on the theories of the gene, evolution, and natural selection.

- 171H. **Our Biological Nature (N)**
Fall. 4(4-0) Honors College students or approval of department.

Various issues confronting us in our attempt to understand our biological selves. Emphasis on the role that science can play in helping to resolve these issues.

- 172H. **Our Place in Nature (N)**
Winter. 4(4-0) Honors College students or approval of department.

Various issues confronting us in our attempt to understand our place in and relation to the environment. Emphasis on the role of science in helping to resolve these issues.

- 173H. **Science-Technology and Human Values (N)**
Spring. 4(4-0) Honors College students or approval of department.

The nature and significance of science and technology in Western culture, with emphasis on their relationship to other creative activities, particularly those within the arts.

1814. **Natural Science (N)**
Fall. 4(3-2) Not open to students with credit in N S 115. Enrollment in Remedial-Developmental Writing Program or approval of department.

Scientific methods emphasizing development and modification of explanation systems. The nature of cells and sexual reproduction as background for Mendelian gene theory and its modern modifications. Social implications are emphasized.

1824. **Natural Science (N)**
Winter. 4(3-2) Not open to students with credit in N S 125. N S 1814 or approval of department.

Scientific methods with emphasis on evolutionary ideas regarding origin of earth features as related to modern problems. Human origins and development are considered, with a number of modern problems.