

**858 Gender, Justice and Environmental Change : Issues and Concepts**  
Spring of odd years. 3(3-0) Interdepartmental with Fisheries and Wildlife; Forestry; Resource Development; Sociology; Geography. Administered by Department of Fisheries and Wildlife. RB: Background in social science, environmental science, or natural resources.

Issues and concepts related to gender, ecology, and environmental studies. Key debates and theoretical approaches to addressing environmental issues from a gender and social justice perspective. Gender and environment issues and processes from a global perspective.

**859 Gender, Justice, and Environmental Change: Methods and Application**  
Spring of even years. 3(3-0) Interdepartmental with Forestry; Fisheries and Wildlife; Resource Development; Sociology; Geography. RB: Background in social science, environmental science, or natural resources.

Methods and case studies related to gender, ecology, and environmental studies. Methodological and fieldwork issues from a feminist perspective in international and intercultural contexts. Qualitative and quantitative methods for integrating social and environmental data.

**867 Social Impact Analysis**  
Spring of odd years. 3(3-0) Interdepartmental with Sociology.

Sociocultural consequences of development programs on populations, communities, and regions in developing and industrial societies. Theory, purposes, methods, outcomes, and uses of social impact analysis.

**880 Issues in Contemporary Archaeology**  
Fall of odd years. 3(3-0) RB: One 300 or 400 level archaeology course. R: Open only to graduate students in the Department of Anthropology. Approval of department.

Theories, issues, problems, and methodological innovations affecting the conduct of research in archaeology.

**890A Individual Readings**  
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 16 credits in all enrollments for this course. R: Open only to graduate students. Approval of department.

Advanced study, based on prior preparation, under faculty direction.

**890B Individual Research**  
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 16 credits in all enrollments for this course. R: Approval of department.

Graduate student projects under faculty direction.

**892 Seminar in Anthropology**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in Anthropology. Approval of department.

Studies in selected fields.

**893 Internship in the Professional Applications of Anthropology**  
Fall, Spring, Summer. 1 to 3 credits.

Supervised professional experience in federal or state agencies, nonprofit organizations, or corporations related to the professional practice of anthropology.

**894 Forensic Anthropology Internship in Forensic Pathology**  
Fall, Spring, Summer. 1 to 4 credits. Fall: Sparrow Hospital. Spring: Sparrow Hospital. Summer: Sparrow Hospital. A student may earn a maximum of 4 credits in all enrollments for this course. P:M: (ANP 842) RB: graduate coursework in human anatomy and skeletal biology

Supervised professional internship in postmortem analysis. Students will attend autopsies and learn procedures that are relevant for forensic anthropology. Individual research project.

**899 Master's Thesis Research**  
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to graduate students in Anthropology. Approval of department.

Master's thesis research.

**999 Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Approval of department.

Doctoral dissertation research.

**490 Independent Study**  
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Not open to freshmen or sophomores. Approval of department.

Special projects arranged by an individual student and a faculty member in areas supplementing regular course offerings.

**491 Special Topics in Arabic Studies**  
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.

Special topics supplementing regular course offerings proposed by faculty on a group study basis.

## ARTS AND LETTERS AL

### College of Arts and Letters

**191 ROIAL Freshman Seminar**  
Fall. 2(2-0) R: Open only to ROIAL students. Academic life as a Residential Option in Arts and Letters (ROIAL) student. The nature and roles of the arts and humanities in individual and community lives. Special topics and activities focused on the arts and humanities and designed to build community.

**192 Arts and Humanities First-Year Seminar**  
Fall, Spring. 4(4-0) P:M: (ATL 1004) or designated score on English placement test. SA: AL 192H Not open to students with credit in AL 192H or ATL 110 or ATL 115 or ATL 120 or ATL 125 or ATL 130 or ATL 135 or ATL 140 or ATL 145 or ATL 150 or ATL 195H or LBS 133 or MC 111 or MC 112.

Theme based exploration of connections across arts and humanities disciplines. Development of skills necessary for successful study of arts and humanities. Significant writing component including drafting, revising, and editing compositions to develop skills in narration, persuasion, analysis, and documentation. Fulfills Tier I writing requirement.

**192H Arts and Humanities First-Year Seminar**  
Fall, Spring. 4(4-0) RB: Designated score on English placement test. R: Open only to freshman Honors College students or approval of college.  
Not open to students with credit in AL 192 or ATL 110 or ATL 120 or ATL 125 or ATL 130 or ATL 135 or ATL 140 or ATL 145 or ATL 150 or ATL 195H or LBS 133 or MC 111 or MC 112 or ATL 115.

Theme based exploration of connections across arts and humanities disciplines. Development of skills necessary for successful study of arts and humanities. Significant writing component including drafting, revising, and editing compositions to develop skills in narration, persuasion, analysis, and documentation. Fulfills Tier I writing requirement.

## ARABIC

## ARB

### Department of Linguistics and Germanic, Slavic, Asian and African Languages College of Arts and Letters

**101 Elementary Arabic I**  
Fall. 4(4-1)  
Basic standard Arabic, Speaking, listening comprehension, reading and writing, with emphasis on developing oral proficiency skills.

**102 Elementary Arabic II**  
Spring. 4(4-1) P:M: (ARB 101)  
Further work on speaking, listening comprehension, reading and writing of standard Arabic, with continued emphasis on developing oral proficiency skills.

**201 Second-Year Arabic I**  
Fall. 4(4-0) P:M: (ARB 102)  
Intermediate-level work on speaking, listening comprehension, reading and writing of standard Arabic, with increased emphasis on reading and culture.

**202 Second-Year Arabic II**  
Spring. 4(4-0) P:M: (ARB 201)  
Further intermediate-level work on speaking, listening comprehension, reading and writing standard Arabic, with continued increased emphasis on reading and culture.

**290 Independent Study**  
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.  
Special projects arranged by an individual student and a faculty member in areas supplementing regular course offerings.

## Arts and Letters—AL

- 200 Cultural Difference and Study Abroad**  
Fall, Spring. 3(3-0)  
Tools for understanding and interacting with individuals from different cultural backgrounds. Awareness of and sensitivity to cultural difference and the role of language study in understanding cultural difference. Preparation for continued study of and exposure to different cultures and languages through study abroad.
- 201 Writing Tutorial**  
Fall, Spring. 2(1-2) RB: Grade of 1.0 or 1.5 in Tier I writing course. C: IAH 201 concurrently, IAH 202 concurrently, IAH 203 concurrently, IAH 204 concurrently, IAH 206 concurrently, IAH 207 concurrently, IAH 208 concurrently.  
Development of writing skills involved in learning and in thinking about and critically reading complex texts.
- 250 Career Strategies for Arts and Letters Students**  
Fall. 1(2-0) RB: Declared major preference in the College of Arts and Letters. R: Open only to undergraduates in the College of Arts and Letters.  
Identify, explore, and prepare for suitable career options. Topics include self-assessment, career development strategies, and job search skills.
- 291 ROIAL Sophomore Seminar**  
Fall. 2(2-0) P:M: (AL 191) R: Open only to ROIAL students. Not open to freshmen.  
Continuation of the Freshman Seminar (AL 191). The role of art in different cultures. What "humanities" means in different cultures and communities and the ways in which the arts and humanities contribute to making us all part of a global community. Expansion from the role of arts and humanities in local communities to comparative study of "arts" and "humanities" across cultures.
- 292 Introduction to Ancient Studies**  
Fall. 2(1-2) Interdepartmental with Classical Studies; History of Art; History.  
Methods and current trends in the study of the Greek and Roman world. Visits to library and museum collections.
- 390H Interdisciplinary Perspectives in the Arts and Humanities**  
Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Honors College students and to other students with approval of College of Arts and Letters.  
In-depth selected topics in the arts and humanities drawing on materials and methods of several disciplines.
- 400 Study Abroad in Arts and Letters**  
Fall, Spring, Summer. 2 to 8 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Not open to freshmen. Approval of college.  
Supervised study of selected topics in the arts, languages, history, philosophy, and religious studies, in relation to particular cultural sites, museums and institutions.
- 485 Foundations of Museum Studies**  
Fall. 3(3-0) Interdepartmental with History of Art; Anthropology. R: Not open to freshmen or sophomores. SA: HA 485  
Activities, functions, and organization of museums. Changing role of museums as cultural institutions.
- 488 Museum Curatorial Practices**  
Fall of odd years. 3(3-0) Interdepartmental with History of Art; Anthropology. RB: (AL 485) R: Open only to juniors or seniors or graduate students. SA: HA 488  
Methods and practices for the development, care, and use of museum collections in research, education, and exhibition activities.
- 490 Independent Study**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P:M: Completion of Tier I writing requirement. R: Approval of college.  
Special project, directed reading and research arranged by an undergraduate student and a faculty member in areas supplementing regular course offerings.
- 491 Special Topics**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of college.  
Special topics supplementing regular course offerings proposed by faculty on group study basis.
- 492 Special Topics in Museum Studies**  
Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with History of Art; Anthropology. RB: (AL 485) R: Open only to juniors or seniors or graduate students. SA: HA 492  
Special topics supplementing regular course offerings.
- 493A Arts and Letters Internship**  
Fall, Spring, Summer. 2 to 8 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Not open to freshmen and sophomores. A student may earn a maximum of 8 credits in AL 493A and AL 493B combined. Completion of Tier I writing requirement, 12 credits in the major. Approval of college.  
Supervised preprofessional field experience in the arts and humanities.
- 493C Museum Internship**  
Fall, Spring, Summer. 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with History of Art. Administered by Department of Art and Art History. R: Not open to freshmen or sophomores. Approval of college.  
Activities, functions and organization of a museum.
- 494 Museum Exhibitions: Theory and Development**  
Spring. 3(2-2) Interdepartmental with History of Art. RB: (AL 485) R: Open only to juniors or seniors or graduate students. SA: AL 486, HA 494  
Theoretical and practical approaches to the planning, design, development, installation, and evaluation of museum exhibitions. Field trip required.
- 495 Research-Mentoring in Black American and Diasporic Studies**  
Fall, Spring. 3(3-0) RB: Courses in African American Literature, African American History, African American Language Use, other courses in the Black American and Diasporic Studies Program. R: Open only to students in the Specialization in Black American and Diasporic Studies.  
Focus on readings and research in the human arts and sciences. Each student works with a black American and diasporic studies faculty mentor in the student's area of study. Training in knowledge creation, production and dissemination.
- 496 Museum Studies Internship**  
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with History of Art. P:M: (AL 485) RB: (AL 498 and AL 494) R: Approval of college.  
A capstone course consisting of supervised professional experience in learning environments such as museums, zoos, botanical gardens, and historic homes.
- 498 Learning in Museums**  
Spring. 3(3-0) Interdepartmental with History of Art; Park, Recreation and Tourism Resources. RB: (AL 485) R: Open only to juniors or seniors or graduate students. SA: HA 487  
Theoretical and practical approaches to understanding and enhancing ways visitors experience museums, zoos, botanical gardens, and other informal learning environments. Creating educational programs, exhibits, and media.
- 805 Rhetoric Theory and History**  
Fall. 3(3-0) R: Open only to graduate students in the College of Arts and Letters, the College of Communication Arts and Sciences or approval of college.  
Historical perspective on major theories, issues, and topics in rhetoric and writing from classical times to the present.
- 821 Proseminar in Comparative Literature**  
Fall. 3(3-0) Interdepartmental with English; Linguistics and Languages; Romance Languages. R: Open only to graduate students in the College of Arts and Letters.  
History and practice of comparative literature including foundational concepts and current directions.
- 822 Methods of Comparative Literature**  
Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with English; Linguistics and Languages; Romance Languages. R: Open only to graduate students in the College of Arts and Letters.  
Case studies in international literary tradition, reception, and transmission. Approaches to genre and period. History and aesthetics of reception.
- 823 Seminar in Comparative Literary Criticism**  
Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with English; Linguistics and Languages; Romance Languages. R: Open only to graduate students in the College of Arts and Letters.  
Theory and practice of comparative literary criticism, with attention to the development of critical approaches and to current topics in the critical literature.

- 825 Comparative Critical Theory**  
Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with English; Linguistics and Languages; Romance Languages. R: Open only to graduate students in the College of Arts and Letters.  
Critical theory of comparative literature, including comparative studies in rhetorical theory and discourse analysis.
- 830 Introduction to African American and African Studies I**  
Fall. 3(3-0) RB: Courses in African American or African Studies.  
Varied approaches to the study of African peoples and the origins and evolution of the Black experience in the United States. Critical examination of the social, economic, and cultural conditions of blacks in the United States.
- 831 Introduction to African American and African Studies II**  
Spring. 3(3-0) RB: Courses in African American or African Studies.  
Comparative examination of the global black experience. Exploration of the intersecting experiences of blacks, Latinos, Asian and Pacific Islanders, and American Indians in the United States.
- 832 Supervision Seminar in African American and African Studies**  
Spring. 3(3-0)  
Supervision and mentoring for doctoral students in African American and African Studies who are working with undergraduate students in the Research-Mentoring course.
- 833 Composition Pedagogies**  
Fall. 3(3-0) R: Open only to graduate students in the College of Arts and Letters.  
Theories and practices of teaching college-level composition.
- 834 The African Atlantic: Women and Religion**  
Fall of odd years. 3(3-0) RB: Some advanced undergraduate course work in religious studies or African American Studies.  
Foundational and recent research literature on issues of women, religion, and The African Atlantic Diaspora.
- 840 Writing in the Sciences**  
Fall, Spring, Summer. 2(2-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Natural Science. Administered by College of Natural Science.  
Discussion and critique of students' writing in peer response workshop groups
- 841 Professional Writing Theory and Research**  
Spring of odd years. 3(3-0) R: Open only to Ph.D. students in Rhetoric and Writing and masters students in Digital Rhetoric and Professional Writing.  
Theory and research informing technical and professional writing practices. Workplace studies, usability research, information design theory, rhetoric of science and technology, research on computer-mediated writing.
- 842 Writing Workshop for Teachers**  
Fall. 3(3-0) R: Open only to graduate students in the College of Arts and Letters or College of Education or approval of college. SA: ENG 840  
Examination of techniques for teaching. Directed practice in writing.
- 848 American Cultural Rhetorics: Theory and Methodology**  
Spring. 3(3-0) R: Open only to graduate students in the College of Arts and Letters, the College of Communication Arts and Sciences or approval of college.  
Current methodological issues in rhetorical approaches to American cultural rhetorics.
- 852 Portfolio Workshop**  
Spring of odd years. 3(3-0) R: Open only to Ph.D. students in Rhetoric and Writing and masters students in Digital Rhetoric and Professional Writing.  
Preparation of professional document portfolios in print and digital formats, including application materials for academic positions and careers as professional and technical writers.
- 862 Approaches to Teaching Texts**  
Spring. 3(3-0) R: Open only to graduate students in the College of Arts and Letters or College of Education or approval of college. SA: ENG 862  
Critical approaches to understanding and teaching texts.
- 872 Methods of Research into Language Learning and Literacy**  
Spring. 3(3-0) R: Open only to graduate students in College of Arts and Letters or College of Education or approval of college. SA: ENG 872  
Concepts and procedures for designing, evaluating, and conducting applied research in English education.
- 875 Theories of Reading and Critical Literacies**  
Spring. 3(3-0) R: Open only to graduate students in the College of Arts and Letters or College of Education or approval of college. SA: ENG 875  
Integration of the teaching of reading and writing. Application of research to the teaching of reading.
- 877 Community Literacy**  
Fall. 3(3-0) R: Open only to Ph.D. students in Rhetoric and Writing and masters students in Digital Rhetoric and Professional Writing and graduate students in the Department of English.  
Applied research in a community organization, non-profit agency, workplace, or school. Theories and designs of service learning pedagogies.
- 878 Composition Studies: Issues, Theory, and Research**  
Spring. 3(3-0) R: Open only to graduate students in the College of Arts and Letters, the College of Education or approval of college. SA: ENG 876  
Issues, research, and theories shaping current work in composition studies. Intersections with studies in literacy, discourse, and critical theory.
- 881 Special Topics in Teaching with Technology in Arts and Humanities**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: Familiarity with Macintosh or Windows platform.  
Teaching with technology in the arts and humanities. Implications of technology for learning strategies and course design, disciplinary and cross-disciplinary applications of technology, testing on the Web, implications of broader access to knowledge for student research and writing, and distance learning.
- 882 Contemporary Theories of Rhetoric**  
Spring of even years. 3(3-0) R: Open only to Ph.D. students in Rhetoric and Writing and masters students in Digital Rhetoric and Professional Writing and graduate students in the Department of English.  
Modern, postmodern, and contemporary rhetoric theories and their impact on writing and writing instruction. Cultural studies, critical theory, feminist discourse theory, rhetorical ethics, visual rhetoric, digital and media theory.
- 885 Research Colloquium**  
Fall, Spring. 2(2-0) A student may earn a maximum of 24 credits in all enrollments for this course. R: Open only to Ph.D. students in Rhetoric and Writing and masters students in Digital Rhetoric and Professional Writing.  
Professional development seminar focused on developing research skills, designing research projects, and preparing publications and conference presentations.
- 890 Independent Study**  
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Approval of college.  
Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.
- 891 Special Topics in Arts and Humanities**  
Fall, Spring. 3(3-0) A student may earn a maximum of 24 credits in all enrollments for this course. R: Approval of college.  
Special topics supplementing regular course offerings, proposed by faculty on a group study basis.
- 892 Seminar**  
Fall, Spring. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in Arts and Letters.  
Directed original research and its presentation. Current topics in Arts and Letters.
- 893 Museum Internship**  
Fall, Spring, Summer. 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with History of Art. Administered by Department of Art and Art History. R: Open only to juniors or seniors or graduate students.  
Activities, functions and organization of a museum.

## Arts and Letters—AL

**893A Internship in African American and African Studies I**  
Fall, Spring, Summer. 1 to 2 credits. RB: Courses in African American and African Studies. R: Open to students in African American and African Studies.

Supervised field work in an African American organization or institution. Direct and practical involvement in the community.

**893B Internship in Professional Writing**  
Spring. 3 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Permission of instructor required.

Internship in a corporate, organizational, or publishing setting. Classroom discussion of workplace issues and documents.

**893C Internship in African American and African Studies II**  
Fall, Spring, Summer. 1 to 2 credits. RB: Courses in African American and African Studies. R: Open to students in African American and African Studies.

Supervised field work in a Black organization or institution outside of the United States. Direct and practical involvement in a community outside of the United States.

**893D Internship in Literacy and Pedagogy**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in the Critical Studies in Literacy and Pedagogy major. Approval of college.

Supervised graduate practicums, observations, or internships in secondary or college writing and literacy classrooms

**898 Master's Research**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course.

Directed research in support of Plan B Master's program requirements

**899 Master's Thesis Research**  
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 15 credits in all enrollments for this course.

Directed research leading to a master's thesis, used in partial fulfillment of plan A master's degree requirements.

**980 Studies in Rhetoric**  
Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students in the College of Arts and Letters, the College of Education or approval of college. SA: ENG 980

Theories of rhetoric in historical and cultural context. Seminar topics variable by term.

**992 Seminar in Language Literacy and Pedagogy**  
Fall. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to doctoral students in the College of Arts and Letters or College of Education or approval of college. SA: ENG 992A

Teaching English literature, language, and composition.

**999 Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 50 credits in all enrollments for this course.

Doctoral dissertation research.

## ASIAN LANGUAGES ASN

### Department of Linguistics and Germanic, Slavic, Asian and African Languages College of Arts and Letters

**290 Independent Study**  
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.

Special projects in an Asian Languages arranged by an individual student and a faculty member in areas supplementing regular course offerings.

**291 Special Topics in Asian Languages**  
Fall. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. Not open to students with credit in ASN 491.

Special topics supplementing regular course offerings proposed by faculty on a group study basis.

**401 East Asian Cultures (W)**  
Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (IAH 211B) and completion of Tier I writing requirement. SA: AL 401

Selected topics in the history and culture of China, Japan, and Korea. Topics vary.

**464 Studies in the Literature of Asia and the Asian Diaspora (W)**  
Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with English. P:M: Completion of Tier I writing requirement.

Selected writers, genres, themes, or regions in Asian and Asian diasporic literature.

**490 Independent Study**  
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to juniors or seniors. Approval of department.

Special projects in Asian Languages arranged by an individual student and a faculty member in areas supplementing regular course offerings.

**491 Special Topics in Asian Languages**  
Fall, Spring. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to juniors or seniors. Approval of department.

Special topics supplementing regular course offerings proposed by faculty on a group study basis.

## ASTRONOMY AND ASTROPHYSICS AST

### Department of Physics and Astronomy College of Natural Science

**101 The Celestial Clockworks**  
Spring. 1(1-0)

Relationship between ancient skylore and timekeeping. Establishment of a calendar and celestial navigation. Development of the Greek horoscope as a time recorder and coordinate system.

**207 The Science of Astronomy**  
Fall. 3(3-0) P:M: (PHY 231 or concurrently or PHY 231B or concurrently or ISP 205 or concurrently or PHY 181B or concurrently or PHY 183 or concurrently or PHY 183B or concurrently or LBS 271 or concurrently or PHY 231C or concurrently) and (MTH 116 or concurrently or MTH 114 or concurrently or LBS 117 or concurrently) Not open to students with credit in AST 201.

In-depth study of one topic in astronomy with emphasis on key discoveries. Topics may be cosmology, the solar system, and the life of stars. Observing with portable telescopes.

**208 Planets and Telescopes**  
Spring. 3(2-2) P:M: (PHY 183 or PHY 183B or PHY 193H) and (MTH 132 or MTH 152H or LBS 118) RB: (AST 207) Not open to students with credit in AST 303.

Origin and nature of the solar system. Planets of the solar system and other star systems. Determination of time and celestial coordinates. Astronomical instruments and observational methods.

**301 Junior Research Seminar**  
Fall, Spring. 1(1-0) P:M: Completion of Tier I writing requirement.

Preparation and presentation of a review paper on a current topic in astronomy or astrophysics.

**303 Planetary System Astronomy**  
Fall of even years. 3(3-0) P:M: (PHY 183 or PHY 193H or PHY 183B) and (MTH 132 or MTH 152H or LBS 118) SA: AST 201

Origin and nature of the solar system. Planets of the solar system and other star systems. Asteroids, meteorites, and comets. Determination of time and celestial coordinates.

**304 Stars**  
Fall of even years. 3(3-0) P:M: (AST 208) and (PHY 215) and (PHY 321 or concurrently) SA: AST 401

Physical processes that determine the structure and evolution of stars. Observations of stars and star clusters. Spectra of stars.

**307 The Milky Way**  
Fall of odd years. 3(3-0) P:M: (PHY 183 or PHY 193H or PHY 183B) and (MTH 132 or MTH 152H or LBS 118) SA: AST 202

Structure and history of the Milky Way Galaxy. Stellar populations. Interstellar medium.

**308 Galaxies and Cosmology**  
Spring of odd years. 3(3-0) P:M: (AST 208) and (PHY 215) and (PHY 321 or concurrently) SA: AST 402

The Milky Way. Structure and content of galaxies. Active galaxies and quasars. The expanding universe. Modern cosmological models.