ASTR 101 Basic Astronomy  
Credits 3. 3 Lecture Hours.  
(ASTR 1303) Basic Astronomy. A qualitative approach to basic stellar astronomy; earth-moon-sun relationships then studies of distances to stars, stellar temperatures, and other physical properties; birth, life on the main sequence of the H-R diagram, and ultimate fates of stars; not open to students who have taken ASTR 111 or ASTR 314.

ASTR 102 Observational Astronomy  
Credit 1. 3 Lab Hours.  
Observational and laboratory course which may be taken in conjunction with ASTR 101 or ASTR 314. Use of techniques and instruments of classical and modern astronomy.  
Prerequisite: ASTR 101 or ASTR 314, or registration therein.

ASTR 103 Introduction to Stars and Exoplanets  
Credits 3. 3 Lecture Hours.  
A qualitative study of stellar birth, stellar structure and evolution, stellar nucleosynthesis, the Hertzsprung-Russell Diagram, white dwarfs, neutron stars, supernovae, black holes, proto-planetary systems, origin of the solar system and the search for exoplanets; utilizes active learning methods that incorporate observations from the current generation of ground and space-based telescopes. Open to all majors.

ASTR 104 Introduction to Galaxies and Cosmology  
Credits 3. 3 Lecture Hours.  
A qualitative study of properties of galaxies, galaxy evolution through cosmic time, galactic archaeology, active galactic nuclei, super-massive black holes, large-scale structure, the expansion history of the universe, cosmological parameters and Big Bang nucleosynthesis; utilizes active learning methods that incorporate observations from the current generation of ground and space-based telescopes. Open to all majors.

ASTR 109/PHYS 109 Big Bang and Black Holes  
Credits 3. 3 Lecture Hours.  
Designed to give an intuitive understanding of the Big Bang and Black Holes, without mathematics, and de-mystify them for the non-scientist.  

ASTR 111 Overview of Modern Astronomy  
Credits 4. 3 Lecture Hours.  
(ASTR 1303 and ASTR 1403, PHYS 1303 and PHYS 1403) Overview of Modern Astronomy. Roots of modern astronomy; the scientific method; fundamental physical laws; the formation of planets, stars, and galaxies; introduction to cosmology; includes an integrated laboratory that reinforces the lecture topics, including hands-on experience with telescopes and imaging of celestial objects; not open to students who have taken ASTR 101 or ASTR 314.

ASTR 119/PHYS 119 Big Bang and Black Holes: Laboratory Methods  
Credit 1. 2 Lab Hours.  
Hands-on understanding of the concepts surrounding the Big Bang and Black Holes; emphasis on the evidence-based decision making process, methods and presentation; for non-scientists. Companion course for ASTR 109/PHYS 109/ASTR 109.  
Prerequisite: ASTR/PHYS 109/ASTR 109 or registration therein.  
Cross Listing: PHYS 119/ASTR 119.

ASTR 285 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum; intended for use as lower-level credit.  
Prerequisite: Approval of department head.

ASTR 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of astronomy. May be repeated for credit.  
Prerequisite: Approval of instructor.

ASTR 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in astronomy. May be repeated 2 times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

ASTR 314 Survey of Astronomy  
Credits 3. 3 Lecture Hours.  
Primarily for majors in science and engineering. Kepler's laws, law of gravitation, solar system, stars, stellar evolution, nucleosynthesis, cosmology, clusters, nebulae, pulsars, quasars, black holes.  
Prerequisite: PHYS 208.

ASTR 320 Astrophysical Research Methods  
Credits 2. 2 Lecture Hours.  
Background and tools used by astronomical researchers in performing analyses; topics include reduction of photometric and spectroscopic data, bivariate and multivariate statistical methods and chi-squared minimization.  
Prerequisites: MATH 171 and MATH 172.

ASTR 401 Stars and Extrasolar Planets  
Credits 3. 3 Lecture Hours.  
How stars are born, how internal structure changes, nuclear fuel burned and ultimate fate; extrasolar planet detection, formation, properties and habitability.  
Prerequisite: ASTR 314.

ASTR 403 Extragalactic Astronomy and Cosmology  
Credits 3. 3 Lecture Hours.  
Physical makeup of individual galaxies and large scale structure in the universe; origin and eventual fate of the universe; interpretation of observational data as it relates to baryonic matter, Dark Matter and cosmological models with Dark Energy.  
Prerequisite: ASTR 314.

ASTR 485 Directed Studies  
Credits 1 to 12. 1 to 12 Other Hours.  
Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum.  
Prerequisite: Approval of department head.

ASTR 489 Special Topics in...  
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified topic of astronomy. May be repeated for credit.  
Prerequisite: Approval of instructor.
ASTR 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in astronomy. May be repeated for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded. 
Prerequisites: Junior or senior classification and approval of instructor.