

LAST REVIEW: 2010-11 **NEXT REVIEW: 2015-16**

(i.e. 2003-2004)

(i.e. 2008-2009)

STATUS: A

(A, I, D)

COURSE TITLE: Astronomy of Stars and Galaxies

COMMON COURSE NUMBER: AST 1004

CREDIT HOURS:

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS:

(Voc. Course ONLY)

Lecture: **48**

Lab:

Clinic:

Other:

PREREQUISITE(S): MAT 0024

COREQUISITE(S): None

PRE/COREQUISITE(S):

COURSE DESCRIPTION *(750 characters, maximum):*

AST 1004 is an astronomy course outlining the important astronomical entities (e.g., stars, gas, dust, galaxies, quasars) beyond the solar system and their evolution in terms of the quantum mechanical effects in the macro world. The students will use writing compositions, observations, and mathematical analysis to analyze these concepts.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s):

4B

Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s):

4B

Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s):

Area

UNIT TITLES

- 1. Island Universes and Quantum Theory**
- 2. The Properties of Stars**
- 3. Stellar Evolution**
- 4. The Realm of the Galaxies**
- 5. Cosmology**

*** Complete the following only if course is seeking general education status ***

GENERAL EDUCATION Competencies and Skills *:

In the box to the right of the Competency/Skill, enter all specific **student learning outcome** unit numbers, as indicated in the course outline (i.e. 1.1, 2.7, 4.2, 4.0 and 5.12) that apply.

Course must include <u>all</u> of the following:	
1. Read with critical comprehension**	1.2, 1.3, 1.6, 2.1, 4.1, 4.2, 6.2
2. Write clearly and coherently**	1.2, 1.3
3. Demonstrate literacy as appropriate within a given discipline**	E: 2.1, 4.5 F: 1.1, 1.2, 1.3, 1.4, 1.5, 2.0, 3.0, 4.0, 5.0
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	2.1, 2.2, 3.2, 4.5
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	2.0, 3.0, 4.0., 5.0
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	
8. Speak and listen effectively.	

**General Education Competencies and Skills endorsed by 2010-2011 General Education Task Force*

****Required Competencies**

1) Read with critical comprehension.

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) Write clearly and coherently.

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) Demonstrate and apply literacy across all the disciplines (indicate which ones apply).

- a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.
- b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.
- c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.
- d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.
- e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.

- f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.
- g) **Environmental literacy** is creating a context within which environmental issues can be viewed, imparting knowledge to enhance one's ability to analyze the issues, make the connections between humans' decisions and actions and the challenges facing the environment, and instilling the desire to sustain the environment through ethical practices in both one's professional and personal lives.

4. Apply problem-solving skills or methods to make informed decisions in a variety of contexts.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.

EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	
2. Short essays	
3. Research Papers	1.2, 1.3, 4.4, 5.4
4. Group projects	
5. Discussions (In class and online)	
6. Multiple Choice tests	1.0, 2.0, 3.0, 4.0, 5.0
7. Presentations	
8. Service Learning Projects	
9. Quizzes (pop, announced, etc.)	1.0, 2.0, 3.0, 4.0, 5.0
10. Take-home tests	1.0, 2.0, 3.0, 4.0, 5.0
11. Summaries, critiques, and analyses	
12. Reaction papers	
13. Surveys	
14. Performance	
15. Short answer tests	1.2, 1.3, 4.4, 5.4
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain)	Observations made at the Observatory: 2.1, 2.2, 4.2, 4.3

Common Course Number: AST 1004

UNITS

Unit 1 Island Universes and the Quanta

General Outcome:

- 1.0 The student shall: be able to diagram the historical development of quantum theory and our modern concepts of the universe.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

Quantum Theory and Island Universes

- 1.1 Identify and compare the different quantum particles; electron, proton, neutron, neutrino, etc.
- 1.2 Read critically from the source material from the major contributors of quantum theory; Bohr, Planck, Einstein, Maxwell, Schrodinger, etc. and evaluate their historical contributions in a written composition.
- 1.3 Read critically from the transcript of the Shapley-Curtis debate on galaxies to evaluate the impact of the concept of Island Universes on modern cosmology.

Observational Astronomy and Astronomical Databases

- 1.4 Identify and compare the basic design of refracting and reflecting telescopes and analyze their use in large scale astronomical surveys.
- 1.5 Differentiate each of the regions of the electromagnetic spectrum to justify our knowledge of the atomic world, i.e. the standard model of the atom.
- 1.6 Demonstrate an ability to extract observations from large scale astronomical survey databases to support different models in astronomy.

Common Course Number: AST 1004

Unit 2 The Properties of Stars

General Outcome:

- 2.0 **The student shall:** be able to analyze and compare the basic properties of the stars.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Measure astronomical distances to the stars and calculate their masses and sizes using observations from our observatory and SIMBAD (Set of Identifications, Measurements, and Bibliography for Astronomical Data) databases.
- 2.2 Arrange the spectral classifications in a Hertzsprung-Russel diagram using the stars' colors, temperatures, and magnitudes using observations from our observatory and SIMBAD databases.
- 2.3 Interpret the importance of binary stars in obtaining fundamental information about masses, temperatures, and other important properties of stars.
- 2.4 Construct the Sun using the temperature, features, and energy production of the layers using the concepts of quantum theory.

Common Course Number: AST 1004

Unit 3 Stellar Evolution

General Outcome:

- 3.0 **The student shall:** be able to analyze the present state of a star and its future evolution.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Identify the stages of star formation; collapse of initial cloud, core formation, condensation of cores, and entrance onto the main-sequence.
- 3.2 Identify isochrones in an H-R diagram and calculate the age of a cluster based on the differing turn-off points on an H-R diagram of a cluster.
- 3.3 Interpret the function of mass in determining a star's main sequence luminosity and its eventual post-main sequence.

Common Course Number: AST 1004

Unit 4 The Realm of the Galaxies

General Outcome:

- 4.0 The student shall:** be able to compare the classes of galaxies and their important properties.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1** Identify the components of our Milky Way; bulge, core, and disk and construct these into our galaxy.
- 4.2** Identify and compare spiral, elliptical, and irregular galaxies with data from the NED (NASA Extragalactic Database) and the Hubble Space Telescope Science Institute databases.
- 4.3** Identify and compare normal and active galaxies from the above databases.
- 4.4** Justify our knowledge of the composition and structure of galaxies.
- 4.5** Identify and compare different methods on calculating galactic distances.

Common Course Number: AST 1004

Unit 6 Cosmology

General Outcome:

- 5.0 The student shall:** be able to compare different theories of current cosmology.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1** Identify and compare different cosmologies of the universe; i.e. steady state, The Big Bang, M-Theory, etc using the concepts of quantum theory.
- 5.2** Assemble the primary observational evidence that is used to support contemporary cosmologies using observations from SIMBAD and NED.
- 5.3** Identify and evaluate which current experiments (i.e. Large Hadron Collider, Laser Interferometer Gravitational Observatory) addressing cosmologies have merit based on stellar and galactic evolution and quantum theory.
- 5.4** Evaluate the current state of the universe by assessing the large scale distribution of luminous matter, dark matter, and dark energy as indicated by present observational evidence.