

### **ASTR 2004H Survey of the Universe Honors**

**Catalog Description:** This course is a basic study of the solar system, stars, galaxies, and the rest of the universe. Three hours lecture and 3 hours lab required weekly. Topics include physical science foundations, celestial motion, planets and planetary formation, stellar and galactic properties, stellar and galactic evolution, and cosmology. Daytime and nighttime observing with telescopes and indoor exercises on selected topics will be included. Several night sessions are required.

**Prerequisite:** Beginning Algebra (MATH 0053), or higher math, or minimum placement scores for Intermediate Algebra (MATH 0103).

**Credit hours / Contact hours/ Load hours:** 4/6/5

**Target Audience/Transferability:** This course is suitable as a physical laboratory science for general education. The class is suitable for students who are majoring in a discipline other than astronomy.

**Student Learning Outcomes:** Students completing this course will:

- Define physics and astronomy terms essential to understanding planetary formation, stellar evolution, cosmology, space-time and gravity.
- Describe and calculate planetary motion, momentum, and force including electromagnetism, gravity and solar flux.
- Interpret composition, structures, stellar and galactic features using remote sensing data, equipment, images, and computer simulations.
- Compare and contrast dynamics of the Earth, Sun, and Moon to other astronomical bodies.
- Integrate new knowledge and scientific reasoning into a framework useful to understanding problems facing the science community and society.

**Honors Program Learning Outcomes:** Students who graduate from the NWACC Honors Program will become proficient in:

- Critical Thinking
  - Apply classroom learning to new problems and life situations
  - Analyze and evaluate evidence
  - Creatively develop original ideas and arguments
- Effective Communication
  - Express ideas and concepts precisely and persuasively in multiple formats
  - Effectively debate ideas and arguments in individual and group settings
- Community Engagement
  - Apply classroom knowledge to local or national issues
  - Serve the community through projects and presentations
  - Demonstrate responsible citizenship
- Valuing Diversity
  - Recognize and evaluate bias, stereotyping, and discrimination in human interaction
  - Respect cultural differences

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- Leadership
  - Formulate own leadership style through study of effective leadership methods
  - Develop skills in leading groups and projects
  - Use knowledge or education to influence others

**Topics:**

- Measuring Positions of Celestial Objects
- The Science & History of Astronomy
- Motion, Energy, and Gravity (Newton's & Kepler's laws)
- Light and Matter
- Telescopes (optics)
- Formation of the Solar System
- Earth Systems
- Planetary Geology of Solar System Objects
- Planetary Atmospheres, Greenhouse Effect, and Jovian Planet Systems
- Other Planetary Objects and Prospects for Life in the Solar System or Universe
- Our Sun
- Properties of Stars
- High and Low Mass Stellar Evolution
- Star Birth and Death
- Our Galaxy
- Universe of Galaxies
- Galaxy Evolution
- Dark Matter, Dark Energy, and the Fate of the Universe
- The Beginning of Time

**Form of Assessment:** Varied forms including, but not limited to, lab and lecture exams, along with a pretest and posttest assessment.