JAMESTOWN COMMUNITY COLLEGE
State University of New York

INSTITUTIONAL COURSE SYLLABUS

Course Title: Introduction to Astronomy

Course Abbreviation and Number: AST 1510 **Credit Hours:** 3 **Course Type:** Lecture

Course Description: Students will learn about the universe while learning the scientific way of looking at the world and life. There will be four fundamental recurring questions: What is out there? Why is it the way it is? How do we know? How sure are we that we are right? Students will learn that science is a process and will learn the connection between theory and observation. Students will demonstrate their knowledge by observations of the sky and by accessing astronomy sites on the World Wide Web.

Eligibility: MAT 1590; Prerequisite: ENG 1510.

General Education Requirements Met

SUNY	JCC
Natural Sciences	Scientific Reasoning

Student Learning Outcomes:

Students who demonstrate understanding can:

1. Read, write, and / or speak about current astronomy topics.
2. Design and interpret graphs or tables of data.
3. Demonstrate an understanding of the following concepts in astronomy
    a. astronomical units and scientific notation
    b. apparent motions of celestial bodies
    c. familiarity and appreciation of the sky using backyard astronomy
    d. seasons of the year
    e. tides and eclipses
    f. electromagnetic spectrum and its use as an astronomical tool
    g. characteristics and properties of stars
    h. life cycle of stars
    i. energy and element formation within the stars
    j. formation, evolution and classification of galaxies
    k. competing theories about the origin of the universe
    l. differentiation between the observable universe and dark matter and dark energy and why this differentiation is important.
4. Demonstrate an understanding of the following astronomical tools:
    a. electromagnetic spectrum
    b. telescopes for different parts of the electromagnetic spectrum
    c. the red shift
    d. HR diagrams
    e. Maxwell-Bolzman Energy distribution graphs
5. Demonstrate an understanding of the methods scientists use to explore natural phenomena, including observation, hypotheses development, measurement and data collection, experimentation, evaluation of evidence, and employment of data analysis or mathematical modeling. [SUNY Gen Ed – Natural Sciences]
6. Application of scientific data, concepts, and models in one of the natural sciences. [SUNY Gen Ed – Natural Sciences]

Topical Outline:

- The scale of the cosmos
- The sky
    - The stars
    - The celestial sphere
- Cycles of the sky
    - Cycle of the Sun
    - Cycles of the moon
    - Astronomical influences on Earth's climate
- The origin of modern astronomy
    - Pre-Copernical astronomy
    - Copernicus

    - Tycho Brahe
    - Johannes Kepler
    - Galileo Galilei
    - Isaac Newton and Orbital motion
- Astronomical tools
    - Radiation: information from space
    - Optical telescopes
    - Special instruments
    - Radio telescopes
    - Space astronomy
    - Optical telescopes
- Atoms and starlight
    - Atoms
    - The interaction of light and matter
    - Stellar spectra
- The Sun – our star
    - The solar atmosphere
    - Solar activity
- The properties of stars
    - measuring the distances to stars
    - intrinsic brightness
    - the diameter of starts
    - the masses of stars
- The formation of stars
    - birth of stars
    - How stars generate nuclear energy
    - Stellar structure
    - Main – sequence stars
    - The Orion nebula
- The deaths of stars
    - Giant stars
    - The deaths of low and medium- mass stars
- The Milky Way
    - The discovery of the galaxy
    - The origin of the Milky Way
- Neutron stars and black holes
- Galaxies
    - Three types of galaxies
    - Mesuring the properties of galaxies
    - Evolution of galaxies
- Galaxies with Active nuclei
    - Active galactic nuclei
    - Quasars
- Cosmology
    - Structure of the universe
    - The Big Bang
    - New thoughts on the Big Bang

Information for Students

- Expectations of Students
    - Civility Statement
    - Student Responsibility Statement
    - Academic Integrity Statement
- Accessibility Services
  Students who require accommodations to complete the requirements and expectations of this course because of a disability must make their accommodation requests to the Accessibility Services Coordinator.
- Get Help: JCC & Community Resources
- Emergency Closing Procedures
- Course grade is determined by the instructor based on a combination of factors, including but not limited to, homework, quizzes, exams, projects, and participation. Final course grade can be translated into a grade point value according to the following:

A=4.0	B+=3.5	B=3	C+=2.5	C=2	D+=1.5	D=1	F=0

- Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, VA appointments) are welcome and encouraged to communicate these to the instructor.

Effective Date: Fall 2023