

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



COURSE OUTLINE

ASTR 101 – ASTRONOMY OF THE SOLAR SYSTEM

Prepared By: Dr. David C. Bradford

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY
PHYSICS
MAY 2015**

- A. **TITLE:** ASTRONOMY OF THE SOLAR SYSTEM
- B. **COURSE NUMBER:** ASTR 101
- C. **CREDIT HOURS:** 3
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:** 3 hours lecture per week
- H. **CATALOG DESCRIPTION:** This course is an introduction to the science of astronomy and is a study of our immediate neighborhood in the universe, the solar system. Topics included are the appearance of the sky, the earth as a planet, light, telescopes and their applications, the physical nature of the planets, the motion and surface of the moon, lesser bodies in the solar system, origin and evolution of the solar system, and the possibilities for extraterrestrial life.
- I. **PRE-REQUISITES/CO-REQUISITES:** None
- J. **GOALS (STUDENT LEARNING OUTCOMES):**
By the end of this course, the student will be able to:
- | <u>Course Objective</u> | <u>Institutional SLO</u> |
|--|---|
| a. Appreciate the scale of the universe and basic structure in relationship to the solar system. | 2. Crit. Thinking |
| b. Give an historical perspective on the development of modern astronomy in conjunction with the development of Newtonian Mechanics and an understanding of gravity, as illustrated by the shift from a geocentric to heliocentric model of the solar system. | 1. Communication
2. Crit. Thinking |
| e. Discuss the cosmological principle and how our understanding of physical laws allows us to remotely probe the solar system. | 1. Communication
2. Crit. Thinking |
| h. Discuss how the structure and composition of the different components of the Solar System do or do not support current theories of the Solar System's formation 4.5 billion years ago. | 1. Communication
2. Crit. Thinking |
- K. **TEXTS:** Palen, Kay, Smith, and Blumenthal 2012. *Understanding Our Universe, 1th Ed.*, W.W. Norton & Co., New York, N.Y. 10110-0017
- L. **REFERENCES:** Evolving on-line material and Stellarium planetarium program
- M. **EQUIPMENT:** computers

N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Paper
- In-class computer based activities
- Short answer homework

P. **DETAILED COURSE OUTLINE:**

- I. Our place in the universe, the observable universe, Big Bang, and how do we know
 - A. Scale of the Solar System
 - B. Scale of the observable universe
 - C. The Big Bang and looking back in time
 - D. How do we know – the scientific method
 - E. Is Astrology science?
- II. Looking for patterns
 - A. Why do we have seasons?
 - B. Motion of the fixed stars, constellations, and the Celestial Sphere
 - C. Phases of the Moon
 - D. Motion of the Sun and the planets defines the ecliptic and the Zodiac
- III. Historical perspective on the co-evolution of Astronomy and Physics
 - A. Contributions by the ancient Greeks
 - B. Heliocentric and Geocentric models of the Solar System
 - C. Retrograde motion
 - D. Contributions by Ptolemy, Brahe, Copernicus, and Galileo
 - E. The Laws of Kepler and Newton
 - F. Gravity and diverging light as examples of the inverse square law
- IV. Light and Telescopes
 - A. The wave model of light
 - B. Wave particle duality
 - C. Spectroscopy and the Doppler shift
 - D. Continuous, absorption line, and emission line spectra; and what they tell you
 - E. Reflecting and refracting telescopes
 - F. Resolution, the atmosphere, and astronomy in practice
- V. The formation of stars and planets
 - A. Molecular clouds start the process
 - B. Protostars becoming stars
 - C. The birth of planets
 - D. Compare and contrast the composition and characteristics of the eight planets
- VI. The inner terrestrial planets
 - A. The processes that shaped our Earth
 - B. Impacts help shape the evolution of a planet
 - C. Plate tectonics and volcanism
- VII. The outer Jovian gas giants
 - A. A journey down through the clouds
 - B. Violent weather on the giant planets
 - C. Magnetic properties

- D. The rings around the giant planets
- VIII. Small bodies of the Solar System
 - A. Dwarf planets Pluto and others
 - B. The moons of planets
 - C. Asteroids and comets
- IX. Space probes exploring the Solar System
 - A. Voyager I and II
 - B. Future planned missions
- IX The search for signs of extraterrestrial life
 - A. Water on Mars
 - B. Discovering extra-solar planets

Q. **LABORATORY OUTLINE:** N/A