

TOHONO O'ODHAM COMMUNITY COLLEGE



Syllabus: **AST 101N: The Solar System**

Course Information

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| Course Prefix/Number: AST 101N Semester: Spring 2019 Class Days/Times: Hybrid format (mixed classroom and online): Monday 5—7 (this is an optional, in-person class meeting). | Credit Hours: 4 (equals 3 lecture + 3 lab periods). Course Title: “The Cosmic Perspective: The Solar System, 8e” Room: Computer Lab, MB 24 |
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| Instructor Information: Name: Michael Newberry, Ph.D. | Phone text & voice mail: 520-241-1525 E-mail: ast101tocc@gmail.com Office location: On-line Office hours: On-line or by appointment |
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Course Description

AST 101N: The Solar System: Introduction to the science of the nature and origin of the solar system, the sun and its family of planets, comets, and asteroids. Includes the history of astronomy and special topics regarding the space program. Scientific thinking as an application of critical thinking and science in contrast to pseudoscience is also covered. Lecture and lab are integrated.

Prerequisite

Completion of MAT 092 Elementary Algebra, assessment at or completion of WRT 101 or signature of instructor.

Credits

4 credit hours. Lecture and lab are integrated. Both the lecture and lab can be completed at TOCC or using computers off-campus or at home.

TOHONO O'ODHAM COMMUNITY COLLEGE

Student Learning Outcomes

After completion of the course students will be able to ...

1. Discuss how astronomical observations contributed to the scientific revolution of the 17th century and explain the evidence for a heliocentric model for our solar system.
2. Describe and explain the apparent motions of celestial bodies as seen from an observer on Earth and apply this knowledge in order to predict positions and appearances of objects on the sky as a function of time and the observer's location.
3. Describe current theories of planet formation and relate these to the present-day structure of our own solar system.
4. Recognize the immense spatial and time scales of the solar system and compare & contrast these with human scales using scientific notation, distance ranking and scale models.
5. Predict orbital parameters for gravitating systems by applying Kepler's laws of planetary motion and Newton's laws of motion and Universal Gravitation.

Course Structure

This course is an integrated lab/lecture course where the labs are integrated into the regular class periods. This class is delivered online, with an optional, but recommended, meeting one day per week. This course consists of ten units. Each unit consists of assignments in Pearson "Mastering Astronomy", "SkyGazer" Labs, and other assignments.

Course Assessment

Course assessment consists of four exams, on-line Pearson assessments, labs, and a presentation.

Textbook, Software, and other Materials:

- "Mastering Astronomy with Pearson eText -- ValuePack Access Card" for *The Cosmic Perspective*, 8th Edition, Jeffrey O. Bennett, Megan O. Donahue, Nicholas Schneider, Mark.
- Textbook: *The Cosmic Perspective, The Solar System* 8th Edition.
- *Lecture Tutorials for Introductory Astronomy*, 3rd Edition, Edward E. Prather, Tim P. Slater, Jeff P. Adams, Gina Brissenden.
- SkyGazer Software (available on computers in MB 24 and the Student Tutoring Center, or you may install it on your own computers.
- Portable Telescopes (provided by TOCC) for outdoor observing of the night sky.
- Binoculars (provided by TOCC) for outdoor observing of the night sky.

TOHONO O'ODHAM COMMUNITY COLLEGE

Himdag Cultural Component

This course includes a written project in which each student must interview an elder to learn more about how the traditional uses of astronomy by the Tohono O'odham.

Policies and Expectations

Course Policies Requirements

- 1) Attend the (optional) class meeting on Mondays;
- 2) Complete in-class and on-line assignments and submit to the instructor;
- 3) Attend the class observing nights;
- 4) Take all exams.
- 5) Complete all class projects and presentations.

Attendance

You are expected to arrive to class meetings on time and actively participate each class period.

Make-up policy

Missed exams can be made up within two days of the exam date. Late assignments that can be made up will be accepted but will be penalized 25%. At the instructor's discretion, extra credit opportunities and optional activities may be provided.

Academic Integrity

Violations of scholastic ethics are considered serious offenses by Tohono O'odham Community College, the Student Services Department, and by your instructor. Students may consult the TOCC Student Handbook sections on student code of conduct, on scholastic ethics and on the grade appeal procedure. Copies are available at Tohono O'odham Community College.

All work done for this class must be your own. While you may discuss assignments with other class members, the written assignments must clearly be your own. You may use work from other materials if it is properly cited. Copying from a book without proper reference or from a person under any circumstances will result in an "F" for the assignment, and at the instructor's discretion, possibly an "F" for the course.

ADA Compliance

Tohono O'odham Community College strives to comply with the provisions of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. If you have a learning problem, physical disability, or medical illness that requires

TOHONO O'ODHAM COMMUNITY COLLEGE

you to have any special arrangements, please contact the Disability Resource Office (520-383-0033) at the beginning of the semester so your academic performance will not suffer because of the disability or handicap.

Classroom Behavior

- Because of insurance limitations, non-registered visitors are not allowed at class sessions or on field trips.
- Possession of drugs, alcohol or firearms on college property is illegal.
- Food and beverages are allowed in classrooms.
- Pets, telephones, pagers and other electronic devices that distract students are not allowed in classrooms.
- Students creating disturbances that interfere with the conduct of the class or the learning of others will be asked to leave.

Course Feedback

All assignments, written papers and quizzes will be graded and returned to the students one week after the assignment is due. E-mail and phone messages will be returned within two days. A student or the instructor may request a student conference at any time during the semester. Students should regularly check Canvas to monitor their grades.

Instructor Withdrawals

Students who have missed four consecutive classes, not submitted any assignments nor taken any quizzes by the 45th day census report, due on October 5, 2018 are assumed NOT to be participating in the class and will be withdrawn. Students may withdraw from class at any time during the first 2/3 of the semester without instructor permission and without incurring any grade penalty. Please be sure to withdraw yourself by November 2, 2018 if you do not expect to complete the class, otherwise you may receive an "F" grade.

Incomplete (I) grades

An "I" grade (incomplete) is not available for this class.

Special Withdrawal (Y) grade

The "Y" grade is an administrative withdrawal given at the instructor's option when no other grade is deemed appropriate. Your instructor must file a form stating the specific rationale for awarding this grade. "Y" grades are discouraged since they often affect students negatively. Your instructor will not award a "Y" grade without a strong reason.

Final Grades

Students will receive a grade transcript from the college mailed to the address given with registration materials at the end of the semester when all grades have been recorded.

SPECIAL NOTE TO STUDENT

For privacy and security reasons, instructors are advised **NOT** to give grades over the telephone. Grades will only be emailed with written permission from the student.

Your instructor will make every attempt to follow the above procedures and schedules, but they may be changed in the event of extenuating circumstances.

Students submitting assignments through the mail or by email are advised to make copies for their own protection.

If you move during the semester, please file a change of address form with the *Student Services Office* and inform your instructor.

Course Outline (see the Course Schedule for specific dates):

- I. General Introduction
 - A. What is Science?
 - B. The role of mathematics in science
 1. Quantitative vs. qualitative understanding
 2. Linear and angular measurement
 3. Unit conversion
 4. Equations
 5. Graphing
 - B. What is Astronomy?
 - C. Value of Astronomy and benefits to the individual
 - D. Scientific Method and the central role of skepticism
 1. Contrast with Pseudoscience
 2. Possible Pseudosciences to examine as related to Astronomy
 - a. Astrology
 - b. Scientific creationism as related to the solar system and the origin, age and life on Earth
 - c. Jupiter effect
 - d. Moon muddling
 - e. Comets as mystical messengers of doom
 - f. Immanuel Velikovsky's Planetary Billiards
- II. Solar System
 - A. Cosmic perspective: the Solar System's location in space and time
 - B. General description and structure
 - C. Age of the Solar System
 - D. Origin: theory and evidence
 - E. Planets orbiting other stars
- III. Descriptive Study of Individual Objects

TOHONO O'ODHAM COMMUNITY COLLEGE

- A. Sun
- B. Earth and Moon
 - 1. Tidal effect
 - 2. Solar-Terrestrial connections
 - 3. Origin of the Moon
- C. Mercury
- D. Venus
- E. Mars and satellites
- F. Jupiter and satellites
- G. Saturn and satellites
- H. Uranus and satellites
- I. Neptune and satellites
- J. Pluto and Charon
- K. Comets, asteroids, and their origins
- IV. History of Astronomy
 - A. Astronomical practice, invention, and discoveries around the world
 - B. Development of modern science
 - 1. The Greeks
 - 2. Aristotelian Science
 - 3. Demise of Science
 - 4. Islamic contributions
 - 5. The Scientific (Copernican) Revolution and its impact on the World
- V. The Technical Development of Modern Astronomy
 - A. Major Observatories
 - B. Telescopes
 - 1. Optics
 - 2. Instruments
 - C. Celestial coordinates
- VI. Space Exploration and Development
 - A. History
 - B. Values: costs versus benefits
 - C. Future explorations and economic development
- VII. Reprise: Cosmic Perspective—Beyond Global Awareness
 - A. Our location in time and space
 - B. Astronomical numbers
 - C. Specialized units
- VIII. In-Class Collaborative Exercises and Activities
 - A. Solar System to scale
 - B. Solar System models
 - C. Celestial Sphere and star charts
 - D. Equatorial coordinates
 - E. Horizon coordinates
 - F. Lost on the Moon
 - G. Planetary models
 - H. Discussion groups on varied topics
 - 1. Aspects of Pseudoscience

TOHONO O'ODHAM COMMUNITY COLLEGE

- 2. Global warming and what to do about it
- 3. Space exploration: pros and cons
- 4. Pluto as a planet: pros and cons
- IX. Individual Laboratory Exercises using SkyGazer software
 - A. Terrestrial and Jovian planets
 - B. The Celestial Coordinate System
 - C. Kepler's Laws
 - D. Motions of the Moon
 - E. Motions of the Sun
 - F. Constellations, Stars, and Celestial Phenomena
 - G. Eclipses
- X. Videos and Animated figures Related to Lecture Topics
- XI. Space Exploration and Economic Development
 - A. Historical development
 - B. Future exploration possibilities
 - C. Pros and cons of space development
- XII. Observation Projects
 - A. Moon
 - B. Planets and their satellites
 - C. Identifying bright stars and constellations
 - D. Finding asteroids

DISCLAIMER: This syllabus is designed to evolve and change throughout the semester based on class progress and interests. You will be notified of any changes as they occur.