

TOHONO O'ODHAM COMMUNITY COLLEGE



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

Course Information

Course Prefix/Number: AST 101N	Credit Hours: 4 (3 lec; 3 lab periods)
Semester: Spring 2018	Course Title: The Solar System
Class Days/Times: M/W 9-11:30	Room: IWK 24

Instructor Information:

Name: Dr. Christina Williams

Phone/Voice Mail: (email only)

E-mail: cwilliams@tocc.edu

Office Location : N/A

Office hours: By appointment, before or after class

Course Description: Introduction to the science of the nature and origin of the solar system, the sun and its family of planets, and comets and asteroids. Includes the history of astronomy and special topics regarding the space program. Includes scientific thinking as an application of critical thinking and science in contrast to pseudoscience. Lecture and lab are integrated.

Student Learning Outcomes (SLOs) :

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 and 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.

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Course Structure: This course is an integrated lecture with labs during regular class periods. Each class meeting will consist of introductory lecture to be combined with class labs, activities, and/or observations based on the concepts presented in the lecture. Course will include reading and homework to be completed outside of class.

Course Assessment: This course consists of 2 exams, 2 class projects, in-class labs and homework assignments. Class participation and attendance will also count towards the final grade.

Texts and Materials:

Text: The Cosmic Perspective Fundamentals (2nd edition)

Other Materials: Lecture Tutorials in Astronomy and other materials distributed in class

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Himdag Cultural Component:

Students will conduct a research project of Tohono O'odham cultural connections to astronomical phenomena (the moon and sun, seasons, stellar and planetary motions) to be presented in and integrated into the class.

Policies and expectations-

Course Policies Requirements: (1) Attend class regularly on Monday/Wednesday; (2) Complete in-class and on-line assignments and submit to the instructor; (3) attend all observing nights; (4) Take all exams (5) Complete all class projects & presentations.

Attendance: You are expected to arrive to class 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 final written project must clearly be your own. You may use work from books and 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 you to have any special arrangements, please inform your instructor 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

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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 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 March 2nd, 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 March 30th, 2018 if you do not expect to complete the class, otherwise you may receive an "F" grade.

Incomplete (I) grade:

"I" grades are not awarded automatically. The student must request an "I" from the instructor who will judge the student's ability to complete the course on his or her own. Generally the student must have completed over 80% of the course requirements with at least a "C" grade. An "I" requires a written contract between the student and the instructor listing work to be completed as well as how and when the work will be done. If the work is not completed within the contract period, the "I" grade automatically reverts to an "F." "I" grades will not be re-evaluated during the final two weeks of the semester when class activities are normally at their most intense.

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.

GOOD LUCK!

Course Outline (see 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
 - 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

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- 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
 - 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
 - A. Terrestrial Planets Mercury and Venus
 - B. Terrestrial Planets Mars
 - C. Kepler's Law
 - D. Sidereal time
 - E. Stellar parallax
 - F. Measuring large distances
 - G. Lunar geology
 - H. Construction of a sun dial
- X. Videos 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. Standardized observing and recording of sky phenomena
 - B. Sun
 - C. Moon
 - D. Planets and their satellites
 - E. Identifying bright stars and constellations
 - F. Star counts
 - G. Finding asteroids
- XIII. Potential Field Trips
 - A. Kitt Peak National Observatory
 - B. Whipple Observatory on Mt. Hopkins
 - C. Flandrau Planetarium
 - D. Group observational session at a dark site with telescope
 - E. University of Arizona Mirror Lab

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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.