

Undergraduate

Prepared By: Chris Littler  
Phone: 4280

5/26

REQUEST FOR  
**ADDITION OF COURSE TO  
CORE CURRICULUM**

College/School: CAS  
Department: PHYS

Subject Prefix: PHYS Course Number: 1052 Semester Credit Hours: 3

TCCNS Number (if applicable) 1404 Hours Per Week: 3 Lecture  
(common course number) 2 Lab  
Title Astronomy: The Solar System Recitation  
Short Course Title : The Solar System Other  
(maximum 22 characters including spaces)

Category of Core Curriculum course is to be added: Natural Sciences

Catalog Description:

History of astronomy and the physical properties of the earth, moon, planets and minor bodies. Includes weekly outdoor and indoor laboratory exercises.

Prerequisite(s):

Proficiency in algebra (MATH 1100 or above).

If course is cross-listed, indicate below:

Department: \_\_\_\_\_ Subject Prefix/Course Number: \_\_\_\_\_  
Department: \_\_\_\_\_ Subject Prefix/Course Number: \_\_\_\_\_

Justification for course to be added to Core Curriculum (Include how course would satisfy each exemplary objective.):

1. To understand and apply the scientific method and appropriate technology to the study of natural sciences. **We define the scientific method early in the course and apply it to models of the solar system throughout the lecture and lab. In lab, students use telescopes to observe solar system objects and use computers to process and study digital images of astronomical objects.**
2. To recognize scientific and quantitative methods of inquiry, and to be able to communicate findings, analyses, and interpretations based upon these approaches. **Students use scientific and quantitative methods of inquiry throughout the lecture and lab. They conduct astronomical observations and communicate their findings, analyses, and interpretations, both verbally and orally, throughout the lab.**
3. To identify and recognize the differences among competing scientific theories. **The course presents and discusses different theories for the structure and evolution of the solar system in the lecture and lab.**
  - A. Explore the natural sciences. **Students explore astronomical concepts throughout the lab. They read background information, collect and analyze data, and come to independent conclusions. They also learn about technologies, such as telescope design, spectroscopic techniques, and computer-based data analysis in the course and lab.**
  - B. Gain the skills required to explore and test ideas. **Students learn and apply the results of scientific models extensively in this course. They also use lab equipment and graphical techniques to obtain and analyze data, and test ideas about what they observe.**
  - C. Be able to locate, evaluate, and organize site information including the use of information technologies. **Students learn and use several celestial coordinate systems to locate solar system objects and analyze their features and movements. They explore websites and report on missions to solar system objects.**

- D. Think critically and creatively, learning to apply different systems of analysis. **In the lab, students observe and analyze the properties and motions of solar system objects using the results from geology, chemistry, biology, elementary celestial mechanics, and classical mechanics (kinematics).**
- E. Develop problem-solving skills that incorporate multiple viewpoints and differing contexts in their analysis. **Students analyze their observations from multiple viewpoints and contexts in the lecture and lab. An example of this is applying new theories concerning the origin of comets, asteroids, and meteors and recognizing the physical clues that help reveal these origins.**
- F. Cultivate intellectual curiosity and self-responsibility, building a foundation for life-long learning. **Astronomy has always stimulated intellectual curiosity among students. Topics in the course and laboratory are chosen to promote and satisfy this curiosity. As an example, we are able to show the students the results of a runaway greenhouse effect (Venus) and emphasize the role of the informed citizen in society to be "eco-minded" and protect our favored status in the solar system.**
- G. Have the ability to read intelligently, write clearly, and speak well. **During discussions, students speak extensively throughout the lecture and lab. They both write and speak extensively in the lab, in the context of studying, understanding, and evaluating various properties of the solar system.**

Consultation with University Curriculum Assessment Committee member:  
 Department: MATH Contact: W. Cherry Date: 5/5/09

- New Core Curriculum Requests must include:
- Syllabus:  Maximum 4-page syllabus attached
  - Assessment:  Consultation w/University Curriculum Assessment Committee member in this core component group.
  - Assessment procedures (criteria to be used in assessing this course) must be attached separately

**APPROVED:**

Department Chair: \_\_\_\_\_ Date: 5/6/09  
 College/School Curriculum Committee Chair: B. Sumahe Date: 5/13/09  
 Dean of College/School: B. Sumahe Date: 5/13/09  
 Core Oversight Committee Chair: \_\_\_\_\_ Date: \_\_\_\_\_  
 University Curriculum Committee (VPAA): \_\_\_\_\_ Date: \_\_\_\_\_

# Descriptive Astronomy: The Solar System

PHYS 1052.xxx Term Year

Time Room

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Instructor  
Office:  
Phone:  
E-mail:  
Office Hours:

Lab Coordinator: Lena Lackey  
Lab Director: Ron Dilulio  
Lab E-mail: [astrolab@unt.edu](mailto:astrolab@unt.edu)

Lecture Website: <https://ecampus.unt.edu/webct/entryPage.dowebct>  
"PHYS 1052 Descrip Astronomy – Section xxx (Term Year)"  
Laboratory Website: <https://ecampus.unt.edu/webct/entryPage.dowebct>  
"PHYS 1052 Laboratory"

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Text: *The Solar System, 6<sup>th</sup> Edition*, by Michael A. Seeds  
(Brooks/Cole-Thomson Learning, 2007) paperback split

or

*Foundations of Astronomy, 10<sup>th</sup> Edition*, by Michael A. Seeds  
(Brooks/Cole-Thomson Learning, 2007) hardback

Course Objective: This introductory astronomy course offered by the UNT Physics Department provides a brief history of astronomy, gives an overview of the techniques and principles important in astronomy, and examines the Solar System's planets and minor bodies. The course may be used to satisfy the laboratory science requirement for the College of Arts and Sciences or the core laboratory science requirement of the University.

Exemplary Objectives:

1. To understand and apply the scientific method and appropriate technology to the study of natural sciences.
2. To recognize scientific and quantitative methods of inquiry, and to be able to communicate findings, analyses, and interpretations based upon these approaches.
3. To identify and recognize the differences among competing scientific theories.

UNT Core Objectives:

- A. Explore the natural sciences.
- B. Gain the skills required to explore and test ideas.
- C. Be able to locate, evaluate, and organize site information including the use of information technologies.
- D. Think critically and creatively, learning to apply different systems of analysis.
- E. Develop problem-solving skills that incorporate multiple viewpoints and differing contexts in their analysis.
- F. Cultivate intellectual curiosity and self-responsibility, building a foundation for life-long learning.
- G. Have the ability to read intelligently, write clearly, and speak well.

Topics: You are expected to have thoroughly read the chapter in your text before coming to class and will be held responsible for the information contained therein.  
The following is a list of topics covered with the corresponding textbook chapters in parentheses.  
Scale of the Cosmos (Ch 01), The Sky (Ch 02), Phases of the Moon (Ch 03), The origin of Modern Astronomy (Ch 04), Newton, Einstein, and Gravity (Ch 05), Light and Telescopes (Ch 06), The Origin of the Solar System (Ch 19), Earth (Ch 20), The Moon & Mercury (Ch 21), Venus & Mars (Ch 22), Jupiter and Saturn (Ch 23), Uranus, Neptune, & Dwarf Planets (Ch 24), Meteorites, Asteroids, & Comets (Ch 25), Life on Other Worlds (Ch 26).

Attendance: Lectures are designed to supplement and complement the material in the textbook. Missing lecture will likely have a direct negative effect on your ability to do well on quizzes, exams and homework assignments. Although the course notes will be posted in *Blackboard*, class demonstrations, supplemental lecture material (including videos), and daily quizzes will only be available during class.

**Quizzes:** Short quizzes will be given most class meetings. The quizzes will be open-book, open-note, and open-neighbor to encourage discussion of the most important concepts presented. Quizzes can cover any of the material that has been presented in class to that point and will have questions similar to those on the hour exams. Quiz points will count as seven and one-half percent (7.5%) of your course grade.  
***No makeup quizzes will be given.***

**Homework:** Fourteen (14) homework assignments (one for each chapter covered in the course) will be posted on the course website on *Blackboard*. Each assignment will consist of multiple choice questions to be answered online and submitted for grading. The assignment for each chapter will appear as noted in the course schedule below and on the *Blackboard* COURSE CALENDAR. Each assignment will be available for approximately one week. Homework points will count as seven and one-half percent (7.5%) of your course grade.  
***No makeup will be given for missed assignments.***

**Exams:** Three (3) examinations will be given during the regularly scheduled class period as listed in the schedule of the course that follows, along with a final exam. The exam questions will be taken from class notes, quizzes, homework, and the textbook. Exams questions will consist primarily be multiple-choice and True/False. Some questions may require short calculations.  
 Current picture ID required on exam days.  
 Scantrons are provided by the instructor.  
**Makeup Exams: *No makeup exams will be given for missed hour exams.***  
 For documented, University excused absences, contact the instructor (personal conversation, e-mail, or by phone), as soon as possible, preferably prior to the exam.

**Laboratory:** Eight (8) self-scheduled labs (listed in the chart below) are offered during the semester. Labs are scheduled through *Blackboard*, via the "PHYS 1052 Laboratory" class link, "Lab Scheduler" icon. Detailed information about lab locations, transportation to the Rafes Urban Astronomy Center, required materials, and laboratory procedures are posted on the laboratory website listed above. The overall point total you receive for lab coursework will count twenty percent (20%) of your course grade.

Lab Name	Location
Planets and the Zodiac	Planetarium - ENV 150
Ancient and Modern Astronomy	Rafes Urban Astronomy Center
Digital Imaging Basics	Computer Lab - ENV 290
Principles of Optics	Demonstration Lab - ENV 363
Terrestrial Planets	Planetarium - ENV 150
Observations of the Moon and Planets	Rafes Urban Astronomy Center
Digital Image Processing	Computer Lab - ENV 290
Gas Giants and Ice Dwarfs	Planetarium - ENV 150

**Extra Credit:** Up to thirty (30) points of extra credit (2 possible reports, 15 points per report) may be earned to be added to final course point total by attending public shows at the UNT Sky Theater and submitting a summary. Public shows cost \$3.00 w/ Student ID and are usually held on Saturdays at 2:00 p.m. and 8:00 p.m. Two different public shows will be offered during the semester. The exact times/dates will be announced in class as they become available and may be obtained from the website <http://skytheater.unt.edu>.  
 To receive credit (up to 15 points per report),  
 (1) your name & EUID must appear on public show attendance log, and  
 (2) a 300-word, typed summary of the program must be submitted to the course instructor.  
 If you are unable to attend Saturday shows, please contact instructor for an alternative assignment. The alternative assignment consists of a report summarizing a major scientific mission to study an object in our solar system.

***All extra credit papers due Day Date by end of class meeting.  
 NO LATE PAPERS ACCEPTED.***

Grading:	Laboratory	250 points	Final point total = Point Total + Extra Credit	
	Quizzes	75		
	Homework	75		
	Exam 1	150	<u>Final Point Total</u>	<u>Final Course Grade</u>
	Exam 2	150	≥ 895	"A"
	Exam 3	150	795 - 895	"B"
	Final Exam	150	695 - 795	"C"
	Total	1000 points	595 - 695	"D"
	Extra credit	≤ 30 points	< 595	"F"

**Academic Dishonesty and Misconduct:**

Students caught cheating or plagiarizing, as defined in the UNT catalog, will receive a zero ("0") for that particular assignment, lab, or exam. Additionally, the incident will be reported to the dean of students for disciplinary action. It is unlawful for any person to interfere with classes or other university activities by any form of disruption, including excessive noise. The use of cell phones or pagers is prohibited. Violators will be asked to leave and a grade of zero will be assigned.

**Disability Accommodations:**

The Department of Physics, in cooperation with the Office of Disability Accommodation, complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request before the 12<sup>th</sup> class day.



**HEALTH AND SAFETY WARNING: SEIZURES**

The Demonstration lab will be using strobe lighting, which may trigger seizures in photosensitive epileptics. If you think this might affect you, contact the Lab Coordinator for an alternative lab.

## Assessment Plan PHYS 1052

We will assess how well students accomplish the learning objectives with essay questions administered in the laboratory assignments and investigations. Each essay question and laboratory investigation targets a specific objective, and collectively they cover all of the objectives.

### *Exemplary Objectives*

1. To understand and apply the scientific method and appropriate technology to the study of natural sciences.
2. To recognize scientific and quantitative methods of inquiry, and to be able to communicate findings, analyses, and interpretations based upon these approaches.
3. To identify and recognize the differences among competing scientific theories.

### *UNT Core Objectives*

- A. Explore the natural sciences.
- B. Gain the skills required to explore and test ideas.
- C. Be able to locate, evaluate, and organize site information including the use of information technologies.
- D. Think critically and creatively, learning to apply different systems of analysis.
- E. Develop problem-solving skills that incorporate multiple viewpoints and differing contexts in their analysis.
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The following example demonstrates our approach. Note that four of the essays/investigations assess two of the objectives. These essays/investigations will be evaluated (scored) against the first objective in the fall semester and the second objective in the spring semester. The remaining objectives will be scored in the fall or spring, as indicated below. In this manner, we will “isolate” each objective individually over the academic year. Through classroom discussions of Essay 2, we will evaluate the speaking component of Objective G.

Essay or Investigation	Objectives
<b>Essay 1:</b> Describe the steps to the scientific method and apply it to an astronomical problem, such as using Earth-based telescopes to observe the motions of planets and the stars and then assessing different models of the solar system to determine if the models are consistent with the observations.	1 (fall), 2 (spring)
<b>Essay 2:</b> Explain how modern missions to solar system bodies (planets, comets, and asteroids) have contributed to our knowledge of the solar system.	A (fall), C (spring)
<b>Essay 3:</b> Discuss competing theories for the importance of comets in delivering water and the chemical building blocks of Earth-like life to the inner solar system.	3 (fall)
<b>Investigation 1:</b> Study and apply digital image processing technology to astronomical images. Compare astronomical digital data processing to techniques used for standard digital camera image processing.	F (fall), G (spring)
<b>Investigation 2:</b> Explore the solar nebula hypothesis for the formation of our solar system. Discuss how observations of the physical properties of our solar system’s planets and small bodies can be used to support or disprove the hypothesis.	B (fall), E (spring)
<b>Investigation 3:</b> Use lenses and mirrors to investigate the basic optical properties of telescopes. Discuss the advantages and limitations of each method used for gathering astronomical data.	D (spring)

At the beginning of each semester, the faculty coordinator for PHYS 1052 will meet with lab instructors, who will grade the written responses, and discuss scoring protocols.

We will use an integer scale of 1 to 3 to score each essay question and investigation, using the following criteria: 3 = completely right, or missing something minor; 2 = right idea, but missing something important; 1 = wrong idea, but said something remotely relevant; 0 = left it blank, or answer was completely irrelevant.

For each essay question and investigation, lab instructors will give a summary of scores to the faculty coordinator, who will evaluate the data to determine the extent to which students are mastering the objectives. The coordinator, who oversees the lecture and lab content of the course, will adjust the amount of emphasis given to specific components of the course, as well as strategies for teaching those components, to address any learning deficiencies revealed from the above evaluation. For example, if more than one-third of students received less than a 2 on a given essay question or investigation, that would warrant more attention to the course components covering the associated learning objective. The course will be viewed as meeting each objective if 75% of the students score 2 or higher on each essay or investigation.