ASTR 1400 Solar System Astronomy: Honors
Lecture Syllabus Section H01 CRN 47540, Texas Tech University, Spring 2017

This course will satisfy a four-hour laboratory science requirement. It is an introductory course aimed at a general student audience. Science is more important in our daily lives than ever before – scientific reasoning will play a large role in this course.

Instructor

Dr. Robert C. Morehead

Contact

- **Email:** robert.morehead@ttu.edu (Preferred Contact Method)
- **Phone:** (806) 834-7940
- **Office:** Science Building, Room 14, TTU campus
- **Open Office Hours:**
  - Tuesday 11:30am - 12:30pm
  - Wednesday 4:00 - 5:00pm
  - Friday 10:30 - 11:30am

  - **By Appointment:** [http://rmorehead.youcanbook.me](http://rmorehead.youcanbook.me). This site links directly to my calendar and displays all the times I am free, eliminating the need for several emails back and forth to schedule an appointment.

Class Meetings

Monday, Wednesday, Friday 3:00 - 3:50pm
Science Building, Room 10

Learning Objectives
After completing these course students will be able to:

- Identify and describe the features of our Solar System and the physical principles relevant to astronomy.
- Apply quantitative reasoning to solve a variety astronomical and practical problems.
- Recognize Science as a process and summarize how astronomical data is acquired and understood.
- Develop critical thinking tools that can be applied to life outside the classroom.

Required Materials

Textbooks

A textbook is required for the course!

However, you may use any introductory astronomy textbook. Be sure to get a recent edition from the last couple of years or so, astronomy is a field that is constantly making new discoveries and older versions may be significantly out date.

I especially recommend either

- **The Cosmic Perspective: The Solar System (8th Edition)**; by Bennett, Donahue, Schneider & Voit. ISBN-10: 0134073819/ ISBN-13: 978-0-1340738-1-1; Publisher: Pearson. This is only the solar system-focused half of the full version of the text. You can purchase this text in the bookstore and a couple of copies have been placed on course reserves in the library.

  or

- **openstax Astronomy** [https://openstax.org/details/books/astronomy](https://openstax.org/details/books/astronomy); by Fraknoi, Morrison, Wolff, & others. This text is open source and free for students. You may access it as a webpage, download a pdf, or print a copy at cost.

You only need to acquire one text to use for this class. I will assign readings from the relevant sections for each week from both Cosmic Perspective and openstax Astronomy, but you only need to do the readings from one of the books. If you choose to use another text, you will need to find the topics for that week on your own.

**Astronomy 1400: Solar System Astronomy Lab Manual** produced by the Texas Tech Department of Physics. Lab Manual Sales: During the first week of class, there will be signs throughout the building presenting details on Lab Manual purchasing.

**You MUST purchase a lab manual at these times.**

**Voting Card.** I will provide a multiple choice voting card that you are expected to bring to class every day. For lost voting cards, a PDF replacement copy will be available in Blackboard, but
you will need to print it out in color. At the end of the semester, please return you voting card to
me if it still in good shape so I can reuse it in future semesters.

Blank 3 x 5 Index Cards. During each lecture I will be asking you to write a minute essay, which
is a one sentence response to a prompt or answer to question I will ask you. You are required to
turn in your response on a 3 x 5 index card only. Responses on anything other than a 3 x 5
index card will not be accepted. Be sure to bring some 3 x 5 index cards with you to class, as
your responses are what is count towards your attendance grade, and I cannot guarantee that I
will always have spares for you.

Calculators Calculators are not allowed on exams, however, you may use them on homework
(although you should practice not using them). You will need a calculator in lab sessions.

Course Website

Blackboard: http://ttu.blackboard.com. The course webpage is on the Blackboard (BB) system.
Course announcements and homework assignments will be posted on this site. BB will also be
used for electronic communications, and to post other relevant course material (such as
homework solutions, grades, etc.).

Course Requirements

I expect you to be considerate to me and to your classmates during class. You are expected to
turn off phones, iPods, and other electronic devices not necessary for class before class
begins. Laptops are allowed for note-taking or following along with course materials only.
Please arrive on time, do not pack up your things before class is over, remain until the end of the
class period, and notify me before class if you need to leave class early. If you are distracting
your classmates or disrupting the class you will be asked to leave.

In return, I will start and end class on time, give you time in class to discuss concepts with your
classmates, ask for your feedback about the class, and will be welcoming of all of your
questions during class and during my office hours.

Please note that while there is no prerequisite for this class, you will be expected both on the
homework and in the exams to be able to perform mathematical calculations without a
calculator. Examples will be given in class and in the course notes and a required math skills
review exercise will be given during the first week of class. Examples of the mathematical
concepts we will use in this class are:

• scientific notation
• multiplying and dividing powers of 10
• converting between different metric units
• rearranging and solving simple equations (e.g., if $v = H \times d$, solve for $d$ given $v$ and $H$)

A colleague of mine co-authored A Student’s Guide to the Mathematics of Astronomy (ISBN:
9781107610217), and she wrote it specifically to support courses like ours. You may find it useful with the math used in this course. A copy has been placed in the library course reserves for your use.

**Assessment**

Students’ understanding of the learning goals will be evaluated from selected questions on homework assignments, in-class activities, a pre-post concept survey, and exams.

**Class Preparation**

Students are expected to keep up with the material and to not fall behind. It will be assumed that you have looked over the relevant text material before the corresponding lecture, so that the lecture can serve as a concentrated review and clarification, with time for discussion. If you are coming to class “cold,” without having read the material in the text, you will find yourself at disadvantage.

**Grades**

Your final numerical course grade will be calculated as a weighted average of:

- 2 of 3 in-class Exams (lowest dropped): 10% each
- Cumulative Final Exam: 25%
- 10 of 11 Homework assignments (lowest dropped): 18%
- Surveys and Feedback: 4%
- Attendance: 3%
- Laboratory/Observing: 30%

No extra credit is likely to be given and grades will not be rounded up. Although I may adjust the lower end of the grade cutoffs listed below, I guarantee that if your final grade is in the following percentage range you will receive the listed letter grade:

<table>
<thead>
<tr>
<th>Percentage course grade</th>
<th>Letter grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 90.0%</td>
<td>A</td>
</tr>
<tr>
<td>80.00%-89.99%</td>
<td>B</td>
</tr>
<tr>
<td>70.00%-79.99%</td>
<td>C</td>
</tr>
<tr>
<td>55.00%-69.99%</td>
<td>D</td>
</tr>
<tr>
<td>&lt; 54.99%</td>
<td>F</td>
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</tbody>
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**Attendance Policy**

*Faithful attendance is necessary to do well in this course and is required.* During each
class, we will spend some time writing a one-sentence micro-essay, that will answer a review question or give class feedback. You will be required to turn it in on a 3 x 5 index card with your name and your TechID Number (R Number). These micro-essays will just be reviewed for content and will not influence your grade, but your micro essay will be used to determine your attendance. There will be some allowance to miss a small number of classes (life happens), that will be determined by a class discussion on the first day of the course.

You must notify the instructor ahead of time to be excused for absences due to official university events.

If severe illness occurs, seek treatment immediately, contact the instructor as soon as possible, and stay home. A plan for any make-up work will be made on an individual basis, and documentation from a medical professional may be required. In case of an illness that will require absence from class for more than one week, the student should notify his or her academic dean.

**Homework**

There will be several homework assignments during the course, and you will be given two opportunities to complete them on-line within Blackboard, and only the higher of your two grades will count. These will be announced in class, and you will have at least one week to complete them. Do not wait until the end of the time period to complete the homework; problems with a computer or internet access are not acceptable excuses for not completing the homework. All class assignments are due on Blackboard by 11:59 pm "**Typically, no late homework submissions will be accepted.**"

**Feedback and Surveys**

You will also be asked to complete several short surveys and feedback forms on Blackboard during the semester. These will be announced in class and more details will be posted on Blackboard.

**Laboratory**

There is a required laboratory worth 30% of the course grade. You will receive one grade for the lecture and the laboratory combined – they are not separate courses.

**NOTE: If you fail the laboratory portion of this class, you will fail this course!**

In addition to the weekly lab meetings, you have the opportunity to visit the Texas Tech Observatory for some nighttime observations as part of your lab grade. **These observational exercises are not optional.** All necessary information regarding these activities will be posted on the observatory website (linked from the Texas Tech Department of Physics homepage); it
will also be discussed by your laboratory instructor during the first week of class. If no lab is
listed on your schedule, see your professor immediately. Questions about the laboratory
should be addressed to your laboratory instructor, not the lecturer.

Midterm Exam Policy
There will be two midterm exams, however, the grade on the lower exam will be dropped. There
is no make-up day for the midterm exam unless severe illness occurs (see class policies
regarding illness). In the event of a documented direct conflict (two exams scheduled at the
same time on the same day), students should contact the instructor at least 10 days before the
exam. Alternative arrangements for the exam TIME (the exam day will NOT be changed) will be
offered. The midterm exam will cover material up to the date of that exam, it will be
administered in the lecture room, and you will need to bring a non-programmable scientific
calculator, a #2 pencil (with eraser), and your Texas Tech ID.

Final Exam Policy
There will be one final exam worth 25% of the final numerical course grade. There is no make-
up day for the final exam: the Final Exam is mandatory. The final exam is comprehensive, it will
be administered in a room to be announced later in the semester, and you will need to bring a
non-programmable scientific calculator, a #2 pencil (with eraser), and your Texas Tech ID. Final
examination period for SPRING 2017 WILL BE CONFIRMED LATER IN THE SEMESTER BY
THE UNIVERSITY REGISTRAR. For this reason, DO NOT PLAN TO LEAVE TTU BEFORE OR
ON May 16th. TTU’s policy regarding final exams states:

1. ALL Final Exams must be given at the assigned time. They may not be given prior to the
officially assigned time.
2. If a student misses their Final Exam, they must contact their Instructor. This is a matter
between the student and the Instructor. The policy for this class is that no make-up Final
Exams will be given except in the event of severe documented illness.
3. There is no policy on how many Final Exams a student can have in one day. The Final
Exam Schedule was posted in the Schedule of Classes and must be followed. For more
info about the final exam policy, please visit:
http://www.depts.ttu.edu/opmanual/OP34.10.pdf

Course Schedule
This projected schedule is subject to change with advance notice.

<table>
<thead>
<tr>
<th>Week Starting</th>
<th>Theme</th>
<th>Tentative Topics</th>
<th>Assignments Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/19/17</td>
<td>Welcome</td>
<td>Introduction to ASTR 1400</td>
<td>01/27/17</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Notes</td>
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<tr>
<td>01/23/17</td>
<td>Our place in the Universe &amp; the Motion of the Sky</td>
<td>Cosmic Distance and Time Scales, The Age of the Universe, Earth's Motion, The Night Sky</td>
<td>Introductory Survey Math Review</td>
</tr>
<tr>
<td>01/30/17</td>
<td>The Earth-Moon System</td>
<td>Seasons, Phases of the Moon, Eclipses</td>
<td>01/31/17 HW 1</td>
</tr>
<tr>
<td>02/13/17</td>
<td>Motion &amp; Gravity</td>
<td>Kepler's Laws, Orbits, Newton's Laws, Gravity, Momentum</td>
<td>02/14/17 HW 3</td>
</tr>
<tr>
<td>02/20/17</td>
<td>Exam 1</td>
<td>In-Class Review: 02/20/17 In-Class Exam: 02/22/17</td>
<td>02/21/17 HW 4</td>
</tr>
<tr>
<td>02/27/17</td>
<td>Light &amp; Matter</td>
<td>Light, Telescopes, Doppler Effect, Atomic Structure, Spectra, Blackbody Radiation, Heat and Temperature</td>
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</tr>
<tr>
<td>03/06/17</td>
<td>The Sun &amp; the Solar System</td>
<td>Solar Structure, Energy Production in the Sun, Solar Activity, Sunspots and Flares, Formation and Architecture of the Solar System</td>
<td>03/07/17 HW 5 Mid Semester Feedback</td>
</tr>
<tr>
<td>03/13/17</td>
<td>Spring Break</td>
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<tr>
<td>03/20/17</td>
<td>Planet Systems</td>
<td>Exoplanets, Exoplanet Detection, Exoplanet Systems vs. the Solar System, Habitability of Planets</td>
<td>03/21/17 HW 6</td>
</tr>
<tr>
<td>03/27/17</td>
<td>Terrestrial Planet Geology</td>
<td>Geological Structure of Terrestrial Planets, Heat Flow in Planets, Erosion, Plate Tectonics, Comparative Planetology</td>
<td>03/28/17 HW 7</td>
</tr>
<tr>
<td>04/03/17</td>
<td>Exam 2</td>
<td>In-Class Review: 04/03/17 In-Class Exam: 04/05/17</td>
<td>04/04/17 HW 8</td>
</tr>
<tr>
<td>04/10/17</td>
<td>Terrestrial Planet Atmospheres</td>
<td>Origin and Structure of Atmospheres, Circulation in Atmospheres, Climate, Changes in Atmospheres Over Time</td>
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<tr>
<td>04/17/17</td>
<td>Jovian Planets &amp; Icy Moons</td>
<td>Jovian Planet Structure and Atmospheres, Ring Systems, Moon Systems</td>
<td>04/18/17 HW 9</td>
</tr>
</tbody>
</table>
ACADEMIC INTEGRITY

I support the TTU Code of Student conduct. Essentially, it states:

"It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension.

For the remainder of the code, see: http://www.depts.ttu.edu/opmanual/OP34.12.pdf

RELIGIOUS HOLIDAYS

Texas law requires institutions of higher education to excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holiday. The student shall also be excused for time necessary to travel. An institution may not penalize the student for the absence and allows for the student to take an exam or complete an assignment from which the student is excused. While no prior notification of the instructor is required, OP 34.19 indicates that a student who intends to observe a religious holiday should make that intention known to the instructor prior to the absence. The student should make up any missed work. For more information, please visit: https://www.depts.ttu.edu/opmanual/OP34.19.pdf

DISABILITY SERVICES

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor’s office hours. Please note: instructors are not allowed to provide
classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in 335 West Hall or call **806.742.2405**. [http://www.depts.ttu.edu/opmanual/OP34.22.pdf](http://www.depts.ttu.edu/opmanual/OP34.22.pdf)

UNIVERSITY COUNSELING AND RESOURCES FOR DISCRIMINATION, HARASSMENT, AND SEXUAL VIOLENCE

The university experience can be a time of substantial growth for students, filled with changes, challenges and new decisions. Few students move through this time without some personal turbulence, and many experience periods of trauma, crisis, stress, and confusion. The Student Counseling Center staff is available to help students with any problems they may be experiencing. For more information, please visit: [http://www.depts.ttu.edu/scc/](http://www.depts.ttu.edu/scc/). Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, **(806)-742-SAFE (7233)** or file a report online at [titleix.ttu.edu/students](http://titleix.ttu.edu/students). Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are:

- **TTU Student Counseling Center, 806-742-3674**, [https://www.depts.ttu.edu/scc/](https://www.depts.ttu.edu/scc/) (Provides confidential support on campus.)
- **TTU Student Counseling Center 24-hour Helpline, 806-742-5555**, **(Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.)**
- **Voice of Hope Lubbock Rape Crisis Center, 806-763-7273**, [http://voiceofhopelubbock.org](http://voiceofhopelubbock.org) (24-hour hotline that provides support for survivors of sexual violence.)
- **The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110**, [http://rise.ttu.edu](http://rise.ttu.edu) (Provides a range of resources and support options focused on prevention education and student wellness.)
- **Texas Tech Police Department, 806-742-3931**, [http://www.depts.ttu.edu/ttpd/](http://www.depts.ttu.edu/ttpd/) (To report criminal activity that occurs on or near Texas Tech campus.)

SECURITY

It is very important that you familiarize yourself with the emergency procedures for evacuation, fire, flood, medical, violence and workplace threats, and tornado. You can find these procedures at the following link: [http://www.depts.ttu.edu/communications/emergency/procedures.php](http://www.depts.ttu.edu/communications/emergency/procedures.php) In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation,
seek shelter at a predetermined rendezvous location. When clear of the building please continue away from the building and meet class Instructor at Memorial Circle.

**EMERGENCY NOTIFICATIONS AND ALERTS**

TechAlert! is the principal method that the University uses to communicate emergency situations and class cancellations or delays. If you have not already done so this semester, update cell phone, home phone or text message information at: [https://appserv.itts.ttu.edu/EmergencyAlert/](https://appserv.itts.ttu.edu/EmergencyAlert/)