Course Syllabus for PHYS 1341  
(Introduction to Astronomy)  
Spring 2017

Where/When:  
ROB 116  
Tuesday/Thursday; 11:00 am – 12:15 pm

Instructor: Dr. Bob Spiro  
ROB 114  
e-mail: spiro@rice.edu  
(please put course name in the subject line of your email along with the purpose of your email, e.g., “Astronomy, HW question” or “Astronomy, absence”)

Prerequisites: None

Corequisite: PHYS 1141 – Introduction to Astronomy Lab

Office Hours: M-F: 9:00am – 10:30am  
M/T/Th/F: 2:30pm – 4:00pm

Required Text and Supplies:  

Course Description
This course is an introduction to astronomy, aimed primarily at non-science majors. Students study the night sky, our solar system, stars, galaxies, black holes, the Big Bang and cosmology. The course covers the development of astronomy as a science, from Earth's earliest civilizations through our current understanding. The emphasis throughout is on conceptual understanding of how we came to know what we know about the Universe. We begin by compiling a list of questions we might ask about the lights seen in the night sky - questions like how far away they are, how big they are, what they are made of, etc. Next, we investigate electromagnetic radiation (light) and its properties. We use the various properties of light to begin to answer our questions about astronomical phenomena. We learn how and where stars and planets are born, how they live out their lives, and how they die. We look at the behavior of matter over the vast temporal and spatial scales of the Universe, from planets and moons to stars and galaxies. We examine what science can tell us about the beginning and the possible final fate of the Universe. The accompanying laboratory will provide practical activities to reinforce the concepts introduced in class.

Structure of the Course
The course is divided into five major sections: (1) Prologue – Phenomena in the Night Sky, (2) Gravity and Light, (3) the Solar System, (4) Stars, (5) Galaxies and Cosmology. Classes will consist of lectures, discussions, and demonstrations.
Course Objectives and Student Outcomes

Constituency: This course primarily serves non-science majors wishing to satisfy the UST Core Curriculum natural science requirement. It secondarily serves students with an interest in taking astronomy for elective credit.

Overall contribution to UST curriculum: As one of the seven original liberal arts, astronomy is an essential part of the curriculum for any university whose mission centers on liberal learning. Astronomy’s historical narrative is bound up with the conflicts/encounters/integration of Faith and Reason which align well with UST’s educational mission.

Relevant Student learning outcomes:

‣ Outcome 1. Learning fundamental principles, generalizations, or theories
‣ Outcome 2. Learning to apply course materials (to improve rational thinking, problem solving, and decisions
‣ Outcome 3. Gaining broader understanding and appreciation of intellectual-cultural activity (music, science, literature, etc.)
‣ Outcome 4. Acquiring an interest in learning more by asking questions and seeking answers

Core Curriculum Goals:

‣ Core goal 1. To promote the pursuit of knowledge both for its own sake and to form habits of mind through which knowledge and mature into wisdom and understanding can stimulate the contemplation of truth, goodness, and beauty.
‣ Core goal 5. To develop competence in critical thinking, critical reading, effective writing, and oral communication in necessary relation to the skills of gathering, interpreting, synthesizing, and presenting information with integrity and clarity.
‣ Core goal 6. To understand the bearing of the past on the present and the future and to appreciate the historical character of human inquiry in exploring the principal philosophical, religious, political, literary, and aesthetic traditions of Western and world culture.
‣ Core goal 8. To develop aptitude in quantitative reasoning together with knowledge of the methodology of the natural and social sciences in order to foster appreciation of scientific thinking for understanding nature and human behavior.

Grading:

Tests and Examinations: There will be two in-class tests during the semester, plus a final exam. Each test (and the final exam) will be cumulative (i.e., covering all the material studied up to that point during the semester), but weighted toward the material covered since the previous test. Each of the two in-class tests will make up 20% of your raw course grade. The Final Exam will be 30% of your raw course grade. Taken together, the two tests and final exam make up 70% of your grade. The lower of the two in-class test grades can be replaced by your final exam grade if the final exam grade is higher.

Homework: Homework will be assigned on a regular basis. Homework makes up 15% of your raw course grade.

Pop Quizzes: There will be 7 short unannounced pop quizzes given at the beginning of class during the course of the semester. Each pop quiz will be worth 3 points. Everybody who takes a given pop quiz receives 1 point just for being present to take the quiz. The remaining
2 points will be based on how well you answer the pop quiz questions. Pop quiz points represent 15% of your grade. Earned pop quiz points in excess of 15 for the semester will be treated as extra credit points. Missed pop quizzes cannot be made up unless you missed class to participate in an official University function (athletic contest, etc.)

Extra Credit: In addition to excess pop quiz points, you will have frequent opportunities to earn extra credit during the semester. As described below, there is a limit on how many extra credit points you can use to raise your grade. You can earn up to 5 extra credit points by reading an approved book and submitting a 6-8 page paper summarizing the book and your reaction to it. You can earn up to 5 extra credit points by attending and reporting on a Saturday night public star gazing evening at George Observatory at Brazos Bend State Park. Numerous other extra credit opportunities will be announced in class. While the instructor will announce a number of general extra credit opportunities, other unannounced chances to pick up extra credit exist. To access these other opportunities, let me know that you are interested.

To summarize, your raw course grade will be weighted as follows:
Test 1 20%  Test 2 20%  Final Exam 30%  Pop Quizzes 15%  HW 15%

Raw Grade = Test 1 + Test 2 + Pop quizzes + HW + Final Exam
Final Course Grade = Raw Grade + Extra Credit Points

Note: The number of Extra Credit Points that you can apply to raise your Final Grade depends on your Raw Grade. The lower your Raw Grade, the more Extra Credit Points you can use.

The Extra Credit Limit is given by the maximum of (100 – Raw Grade)/3 and 15
For example,
If your Raw Grade = 90 you can use up to (100 – 90)/3 = 3.33 extra credit points.
If your Raw Grade = 80, you can use up to (100-80)/3 = 6.67 extra credit points.
If your Raw Grade = 70, you can use up to (100 – 70)/3 = 10 extra credit points.
If your Raw Grade = 55, you can use up to (100-55)/3 = 15 extra credit points. If your Raw Grade is below 55, you can use at most only 15 extra credit points to raise your final grade.

A final course grade of 90 guarantees a letter grade of A- (or better) for the course.
A final course grade of 80 guarantees a letter grade of B- (or better) for the course.
A final course grade of 70 guarantees a letter grade of C- (or better) for the course.
A final course grade of 60 guarantees a letter grade of D- (or better) for the course.

Attendance Policy—University policy requires that class attendance records be kept. If you miss a class, for whatever reason, it is your responsibility to determine what, if any, work you have missed.

Make-Up Tests—If you miss one of the two scheduled in-class tests for a valid reason, you need to notify me as soon as possible to schedule a make-up test. Valid reasons include sickness, scheduling conflicts with work obligations, and family emergencies.

Disability Statement—If you have a documented disability that will impact your work in
this class, please contact me to discuss your needs. Additionally, you will need to register with the Counseling and Disability Services Office in Crooker Center. This office can be reached at (713) 525-6953 or 3162.

Academic Dishonesty Policy – All students are subject to the university’s Policy on Academic Dishonesty and the UST Student Handbook. I expect any work that you turn in for credit in this class to be your own work, in your own words. I expect you to give proper credit, by citation, to any print or online resources that you use to fulfill class requirements. Exception – information from class notes and the class textbook do not need to be referenced for tests, pop quizzes, and homework assignments.

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<th>Week of</th>
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<th><strong>Lab (Tues)</strong></th>
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<td>Introduction</td>
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<td>1/23</td>
<td>Sky Patterns</td>
<td>Sky Patterns</td>
<td>Celestial Navigation: Intro to night sky, Celestial sphere</td>
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<td>1/30</td>
<td>What Ancients Knew</td>
<td>Copernicus, Tycho, &amp; Kepler</td>
<td>Geometry: angles, ratios, triangulation, parallax</td>
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<tr>
<td>2/06</td>
<td>Galileo</td>
<td>Newton</td>
<td>Keplers laws, Jupiter’s moons</td>
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<td>2/13</td>
<td>Newton &amp; Gravity</td>
<td>Light</td>
<td>Optics &amp; Telescopes</td>
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<td>2/20</td>
<td>Light</td>
<td>Light</td>
<td>Light &amp; Shadow, Lunar phases, Equinox</td>
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<tr>
<td>2/27</td>
<td>Test #1</td>
<td>Formation of Sun and Solar System</td>
<td>Scale model 1: the solar system</td>
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<td>3/06</td>
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<td>Light intensity</td>
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<td>3/13</td>
<td>SPRING BREAK</td>
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<td>3/27</td>
<td>Measuring Stars</td>
<td>Star Formation/ Low-mass Stars</td>
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<td>4/03</td>
<td>Low-mass Stars</td>
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<td>Hertzsprung-Russell Diagram</td>
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<td>4/10</td>
<td>Black Holes</td>
<td>Test #2</td>
<td>Cosmic Distance Ladder</td>
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<td>Expanding Universe</td>
<td>Galaxies/Milky Way</td>
<td>Habitable Zones</td>
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<td>4/24</td>
<td>Cosmology</td>
<td>Life in the Universe</td>
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<td><strong>Final Exam</strong></td>
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