Discover the Universe
AST1002
Spring 2014 Syllabus

Instructor: Dr. Reba Bandyopadhyay
Office: Bryant Space Science Center, Rm. 316
Telephone: 294-1846
Email: drreba@ufl.edu
Lecture time and place: SECTION 0428: MWF Period 6 (12:50-1:40 PM), Pugh 170
Office hours: W 2:00-3:30 or by appointment
Class web site: www.astro.ufl.edu/~drreba/ast1002.html

Required Text: The Essential Cosmic Perspective, 6th Edition by Bennett, Donahue, Schneider, & Voit, with Mastering Astronomy; Pearson Press.

Pre-requisites and Co-requisites: None

Credits: 3

Course Content: This course offers a broad overview of modern astronomy. We will examine how observation, experimentation and exploration have led to our present day understanding of the Earth environment and the Universe we live in. Although this is essentially a non-mathematical science course, a basic knowledge of mathematics is required. Our goal is to help you gain a physical understanding and an appreciation of the cosmos and more generally of the scientific method and how scientific discoveries impact society. Along the way, we will use and practice critical thinking skills and learn how to formulate empirically testable hypotheses.

The topics we will cover include:
  • Motions of the sky
  • A historical development of our understanding of the solar system: An example of the scientific method
  • Light and telescopes
  • The properties of the planets within our solar system
  • The nature and lives of stars
  • The nature of our Milky Way Galaxy
  • Properties of other galaxies
  • The origin and fate of the Universe
  • The search for extraterrestrial life.

General Education:
AST 1002, Discover the Universe, is a GenEd physical science (P) course. As the list of topics above demonstrates, the course covers not only the Universe and the bodies in it -- planets, moons, stars, galaxies, etc. -- but also how we know about those things, making
use of our understanding of the underlying physics of orbits and radiation. The course will focus on major scientific developments in astronomy & astrophysics and their impacts on society and the environment.

Course and Gen Ed Student Learning Objectives & Outcomes:

- To provide students with a broad overview of modern astronomy. This will be accomplished through lectures and weekly reading assignments. Students will be able to define common astronomical terms and explain basic concepts and theories for a range of astrophysical phenomena.

- To teach students the scientific process and how we can understand the Universe using basic physical laws derived on Earth. This will be accomplished through lectures and in-class discussions as well as homework assignments. Students will gain an understanding of how the scientific method is applied to the field of astronomy.

- To review the major scientific developments in astronomy and summarize their impacts on society and our environment such as recognizing our place in the Universe, evaluating the validity of astrology, comparing energy sources, and how atmospheric effects of planets influence climate change. Students will be able to critically evaluate the difference between good science and bad science. Evaluations will be based on in-class discussions, exams and observing project.

- To teach scientific reasoning. Scientific reasoning is the use of logic, observations, and critical thinking to interpret the world around you. This will be accomplished through in-class discussions, homework assignments and the observing project. Students will formulate empirically-testable hypotheses derived from the study of physical processes and phenomena and apply logical reasoning skills through scientific criticism and argument. These skills will serve you well in your daily lives regardless of what career you pursue.

- To improve scientific literacy. Literacy in the basic concepts and terminology of science is necessary if you wish to follow science stories in the news or make informed decisions (such as voting) on issues that pertain to science. This will be accomplished through in-class discussions about current news topics in astronomy and as part of the observing project.

- To help students learn to communicate scientific ideas clearly and effectively using oral, written or graphic forms. This will be done through in-class discussions (oral) and as the written component of the observing project.

Grading Information:
See [https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx) for general UF grading policies. Your grade for the course will be based on the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>In class exams – (2 exams -15% each)</td>
<td>30%</td>
</tr>
<tr>
<td>Cumulative Final Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Observing Project</td>
<td>20%</td>
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<tr>
<td>Homework</td>
<td>20%</td>
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</tbody>
</table>
Grading scale:

<table>
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<tr>
<th>Letter Grade</th>
<th>% Points</th>
<th>GPA</th>
<th>Letter Grade</th>
<th>% Points</th>
<th>GPA</th>
<th>Letter Grade</th>
<th>% Points</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;90</td>
<td>4.0</td>
<td>B-</td>
<td>77 - 79</td>
<td>2.67</td>
<td>D+</td>
<td>64 - 66</td>
<td>1.33</td>
</tr>
<tr>
<td>A-</td>
<td>87 - 89</td>
<td>3.67</td>
<td>C+</td>
<td>74 - 76</td>
<td>2.33</td>
<td>D</td>
<td>60 - 63</td>
<td>1.0</td>
</tr>
<tr>
<td>B+</td>
<td>84 - 86</td>
<td>3.33</td>
<td>C</td>
<td>70 - 73</td>
<td>2.0</td>
<td>D-</td>
<td>57 - 59</td>
<td>0.67</td>
</tr>
<tr>
<td>B</td>
<td>80 - 83</td>
<td>3.0</td>
<td>C-</td>
<td>67 - 69</td>
<td>1.67</td>
<td>E</td>
<td>&lt; 56</td>
<td>0</td>
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Your actual final grade will be no lower than on this scale, which may be curved based on the overall performance of the class. Exams and homework assignments will use the above scale in the form of percentages. For example, a homework assignment or exam may have a total point value of 50; therefore a score of 44/50 = 88% = A-.

**Examinations** (60% of grade): Two in-class examinations will be given during the semester. The approximate dates of the in-class exams are **Friday 21 February** (covering Chapters 1-9) and **Wednesday 9 April** (covering Chapters 10-15). In-class exam dates will be finalized a week prior to the exam; therefore do not use these estimated exam dates in this document to plan vacations etc. Any changes to the in-class exam dates will be announced in class and posted on the website; please do not email me requesting exam dates or inquiring about schedule changes. **Not knowing about an announced and posted schedule change or forgetting the exam date is not an excuse for missing an exam and make-ups will not be granted in such cases.** Make-up exams will only be granted for documented medical or family emergencies.

The final exam (30% of grade) will be **comprehensive** and given during final exam period. The final exam for the **Period 6** class will be given Thursday, **1 May, 3-5 PM**. These exams will test the student’s content knowledge but will emphasize applying critical thinking skills.

**Observing Projects** (20%): One of the most enjoyable aspects of astronomy is actually observing the sky either with the eyes, binoculars or a telescope. Students are expected to attend an observing session at the campus observatory. These take place every clear Friday evening during the semester (directions to the observatory and times are provided in lecture and on the class web site). For your visit, you must complete an project form (download from the class web site) describing in detail the objects that you observe through the telescopes and explaining their astronomical significance. As part of this project you will research an object you observed using recent news or popular science articles and report on what you have learned beyond what has been discussed in lecture. You will also formulate your own hypothesis about an object you observed and explain how you would test this hypothesis using modern telescopes and instrumentation. Finally, you must also obtain a special token for each visit from the staff at the observatory and attach it to your form. Remember to put your name on your form. Please see the instructions on the observing form for further details and specific due dates. **Do not wait until just before the due date to attend the Observatory - it may be cloudy! Turning in your project after your assigned due date will incur a penalty of half a letter grade!**
**Homework (20%)**: Homework will be used during the semester to facilitate and reinforce students understanding of the course material and encourage critical thinking.

All homework will be assigned through the Mastering Astronomy website:
http://www.masteringastronomy.com
You will need to enter a course code to access the online homework and material. The course codes are as follows:
- **Period 6 class**: MABANDYOPADHYAY83915

*Be sure to use the right code for your class period!*

All homework assignments will be due at **6 PM on Wednesdays**. There will be 9 assignments, and their due dates will be posted on the course webpage and announced in class. To receive full credit, assignments must be completed by the due date and time. For late assignments there will be a deduction of 30% per day; homework submitted more than 3 days (including weekend days) late will receive no credit. Extensions on homework assignments will not be granted unless approved no less than 3 days in advance or documentation of a medical issue is provided.

The final aggregate grade for the homework assignments will be calculated as the average score of 8 homework assignments, with your lowest score dropped. If you miss one assignment, that will count as your lowest score; any further missed assignments will be included as a score of zero within the average.

*Please note*: The online homework is a significant component of your final course grade, worth more than one of the in-class exams. Doing the homework carefully and on time can substantially improve your final course grade. Conversely, doing it poorly, submitting it late, or not completing assignments will bring down your final grade, even if you pass the exams. *I therefore strongly encourage you to prioritize the homework assignments for this class.*

**Attendance, Class Participation and Conduct Policy:**
- Attendance at lectures is expected.
- Students should arrive on time and not get ready to leave until the lecture is finished.
- Students are expected to not engage in any activity during class that is distracting to yourself or your fellow students or detrimental to your/their ability to learn. Therefore use of laptops, tablets, and smartphones should be minimized during the lectures (except in cases of documented medical necessity). Please be courteous to the instructor and your classmates by silencing your mobile phone before the start of class and by not engaging in conversation with your fellow students during the lectures.
- There will be weekly reading assignments from the textbook; these will be announced in the lectures and will also be listed on the course schedule on the webpage. Students are expected to read the material in advance of the lectures and be ready to participate in class. PDFs of the lectures will be available via the course website within two business days after the completion of each chapter.
- In order to stimulate critical thinking and gauge how well you understand the
material, questions based on the lectures, reading assignments and projects/homework will be posed in class. Students should participate in the lecture by answering these questions and also by asking your own questions.

Make-up Policy:
Students are expected to complete all requirements by the specified due dates. If a student misses class or an assignment due to an excused absence as specified in the undergraduate catalog and provides the instructor with timely notification, they will be allowed a reasonable time to make up the missed work. The format of a make-up test/exam will be at the discretion of the instructor.

Extra Credit:
You can receive 3% extra credit towards your final course grade for each of the following three activities. Please note: you can do each extra credit option once only. Thus the maximum extra credit achievable is a 9% bonus, for completing all three options:

1. Attend an Astronomy Department Colloquium. These take place at 4 PM every Wednesday during term; see http://www.astro.ufl.edu/~jt/seminars.html for the schedule of talks and the location. To get credit you must submit a substantive written paragraph describing the topic of the seminar and what you found most interesting from the talk. These talks are given by guests of our university, and we want to ensure they are treated courteously during their visit. As such, if you attend one of these talks, please do not arrive late or leave early, and refrain from talking, texting, etc. during the presentation.

2. Attend an astronomy-oriented planetarium show (not a music or laser show!) at the Kika Silva Pla Planetarium at Santa Fe College. To get credit you must turn in your ticket stub from the show together with a substantive written paragraph describing what you learned and found most interesting from the show. There are show times at the planetarium throughout the week; please see the planetarium’s website for a detailed schedule. There is a link to the planetarium webpage from our course webpage.

3. Attend an Astronomy Movie Night. We will show a science fiction movie on campus, and afterwards have a 1-hour discussion session (with written questions to consider) about the astronomy and astronomical phenomena shown in the movie. There will be 1-2 opportunities to attend a movie night; exact dates, location, and movie will be announced at least one week prior to the showing date. To receive the extra credit you must attend the entire movie screening, stay for the entire length of the discussion (a total of approximately 3 hours), and participate in the discussion.

Extra credit written papers should be typed and turned in to me in class or submitted electronically to me via email either as plain text or as a PDF or Word document attachment. Handwritten documents will not be accepted. Reports should be single-spaced, with a maximum of 12-point font size and standard margins. As with all written assignments in this class, I expect extra credit reports to be spell-checked, readable, and written with good grammar and paragraph structure.

All extra credit must be submitted by 6 PM on Wednesday 23 April, which is the last day our class meets before the Final Exam period.
Academic Honesty Policy:
• This is an excerpt from the Academic Honesty Guidelines and Student Conduct Code in the University of Florida Undergraduate Catalog:
  o “Academic Honesty: The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge are diminished by cheating, plagiarism, and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff, and administrators who practice dishonest or demeaning behavior.”

• Cheating is not tolerated in this class. Everyone in this class is expected to follow the University of Florida Honor Code: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. Any student caught cheating will be referred to the Honor Code Chancellor.

• On all work submitted for credit by students at the university, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Accommodations for Students with Disabilities:
• Students who require a classroom accommodation for a disability are required to arrange accommodations with the Disability Resource Center.
• Students must first contact the Dean of Students Office of Disability Resources in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: http://www.dso.ufl.edu/drp/services/.
• The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

UF Counseling Services:
• On-campus resources are available at the UF Counseling & Wellness Center (392-1575) for students experiencing personal or stress related problems.
<table>
<thead>
<tr>
<th>Lecture Date</th>
<th>Lecture Content</th>
<th>Weekly Reading Assignment</th>
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</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Our Place in the Universe – An introduction to the basic concepts in astronomy such as distances, constellations, Sun-Moon-Earth configurations that result in Moon phases and Solar and Lunar eclipses.</td>
<td>Chapters 1 &amp; 2</td>
</tr>
<tr>
<td>Week 2</td>
<td>The Science of Astronomy; Motion, Energy, &amp; Gravity – Learn how the scientific method has been used over hundreds of years to understand the nature of the physical world and Universe well as the impact of key astronomical discoveries on society.</td>
<td>Chapters 3 &amp; 4</td>
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<td>Week 3</td>
<td>Properties of Light – Learn about the nature of light and how astronomers observe various light wavelengths with telescopes to learn about astrophysical phenomena.</td>
<td>Chapter 5.1-5.2</td>
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<td>Week 4</td>
<td>The Tools of Astronomy, Introduction to the Solar System, and the Formation of Planetary Systems – Learn about how astronomers use telescopes to study the Universe. Get an overview of the contents of our solar system and learn how it and other planetary systems are formed.</td>
<td>Chapters 5.3 &amp; 6.1-6.4</td>
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<td>Week 5</td>
<td>Earth &amp; the Terrestrial Planets – Properties of the inner planets are discussed and compared to Earth. Climatological changes and human impact on Earth are discussed.</td>
<td>Chapters 6.5 &amp; 7</td>
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<tr>
<td>Week 6</td>
<td>Jovian Planets, Asteroids, &amp; Comets – Properties of the outer gas giants are discussed and compared to Earth. Learn about the nature of these other constituents of the Solar System which reveal clues about our planetary system and formation.</td>
<td>Chapters 8 &amp; 9.1-9.2</td>
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<td>Week 7</td>
<td>Dwarf Planets – Learn why Pluto is no longer considered to be a planet.</td>
<td>Chapters 9.3-9.4</td>
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<td><strong>Exam 1</strong></td>
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<tr>
<td>Week 8</td>
<td>The Sun – Properties of the Sun and the mechanics of nuclear fusion are discussed.</td>
<td>Chapter 10</td>
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<tr>
<td>Week 9</td>
<td>Properties of Stars – Learn the properties of stars and how they are measured, including some distance determination techniques. Discover how color-magnitude diagrams are used to determine ages and binary star systems to estimate stellar masses.</td>
<td>Chapters 11 &amp; 12.1-12.2</td>
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<td>Week 10</td>
<td>Stellar Evolution, White Dwarfs, and Neutron Stars – Learn about the life cycle of stars. Follow the timeline for a typical, Sun-like star from infancy to death. Learn about the remnants of stars after the end of fusion.</td>
<td>Chapters 12.3-12.4 &amp; 13.1-13.2</td>
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<td>Week 11</td>
<td>Black Holes; The Milky Way – Learn about the dense remnants of high mass stars and discuss the unusual gravitational effects observed near Black Holes. Learn about the properties of our Milky Way galaxy and how the scientific method has been used to uncover the nature of this large system of stars, gas and dust.</td>
<td>Chapters 13.3-13.4 &amp; 14</td>
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<tr>
<td>Week 12</td>
<td>Galaxies, AGN, &amp; Quasars – Discover the different types of galaxies in the Universe and how they compare to the Milky Way. Learn about galaxy interactions and mergers and galaxy evolution.</td>
<td>Chapter 15</td>
</tr>
</tbody>
</table>
| Week 13 | **Exam 2**  
Dark Matter – Discover the importance of dark matter and how it has been identified in galaxies and larger scale structures. | Chapter 16.1-16.2 |
| Week 14 | Structure and Expansion of the Universe, and the Big Bang – Learn how we observe the effects of the Big Bang around us today including the cosmic microwave background, universal expansion and acceleration, the curvature of space and the formation of structure, | Chapters 16.3-16.4 & 17 |
| Week 15 | Life in the Universe – Learn how we are searching for habitable planets in our Galaxy and about the probability of finding life elsewhere in the Universe. | Chapter 18 |
| Exam Week | **Final Exam** | Cumulative – all chapters |