AST 107: The Universe

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Discussion Topics (in approximate order):
Definitions and Scale
Constellations and Sky Motions
Solar Motion
Precession, Time and the Calendar
Moon's Orbit, Phases, Eclipses and Tides
Motions of the Planets
Ptolemy vs. Copernicus
Galileo and Tycho Brahe
Johannes Kepler
Sir Isaac Newton
Universal Gravitation
Discovery of Uranus and Neptune
Scale of the Solar System and Newton's Universe
Albert Einstein and Special Relativity
General Relativity - a New Theory of Gravity
The Electromagnetic Force, Radiation and Spectra
Kapteyn's Universe of Stars
The Shapley Universe: the Milky Way Galaxy
The Leavitt/Hubble Universe of Galaxies
Morphology of Galaxies
Hubble's Expanding Universe
Interpreting Hubble's Law
Big Bang Cosmology
The Steady State Alternative
The Cosmic Background Radiation
Mapping the Universe of Galaxies
Quasars, Active Galaxies and Black Holes
Galaxy Formation
All About Matter: The Standard Model of Physics
Supernovae
The Hot Universe: Element Formation
Dark Matter
Dark Energy and the Future of the Universe
Quantum Mechanics and the Inflationary Universe
String Theory: Putting it All Together?
Course Information

Texts (Supplementary):

T. Kuhn, *The Copernican Revolution*
R. Kirshner *The Extravagant Universe*
S. Hawking *A Brief History of Time*

General Remarks and Math Level:

This is a General Education course designed for students who are not majoring in or planning to major in astronomy or any other physical science or mathematics. It is definitely NOT an appropriate course for a student who is considering the Astronomy major – they should take AST 155. It is assumed that everyone in the course has a standard high school preparation in mathematics that should include the ability to solve simple algebraic equations, understand graphs and do some trigonometry. Mathematics at this level will be used throughout the course -- calculus is not required. Anyone experiencing difficulty with the mathematics can get help from the professor, TA and/or from the Math Workshop.

Writing Course and First Year Seminar:

As an FYS course emphasizing writing there will be a number of writing assignments throughout the semester, culminating in a major paper (5-8 pages) on an astronomical topic of your choice. All of you know how to write pretty well, or you would not have been admitted to Wesleyan. What we hope to work on with you is your ability to think well and express your thoughts well to others, both in writing and orally during class time. In this class you will be writing non-fiction and the idea is to express clearly and in an interesting and informed manner, what your thoughts are on the assigned topic For the final paper you will have great latitude in picking the topic. Please see the Writing Guidelines elsewhere on the Moodle page for additional information.

Lab Work and Observations:

Some astronomy can only be done at night! So, in order for you to see the stars and other objects we are discussing you will sometimes need to go out at night. We will offer special observing nights and sessions that most or all of you can hopefully attend. We will do our best to work around your nighttime schedule, but the universe does not always wait for you. Please try to be flexible about your night schedule. If you have no such flexibility you might want to consider taking a different course.

Special Events:

*Sept. 19 (Sat.), 8-9 P.M.* International Observe the Moon Night
*Sept. 27 (Sun.) 9:30 – 11 P.M.* Eclipse of the Moon
*TBA:* Star Party in Killingworth
Bloom’s Revised Taxonomy of Learning:

In this class:

Remembering and at least partial understanding is expected BEFORE class begins. In class we will work on fuller understanding, applying and analyzing. In a General Education Class we are not really striving to get you to the more advanced levels of learning.

Potential Barriers to Understanding (and what to do about them):

These concepts are beyond me. I can never understand them. This is simply not true. Any Wesleyan student can understand the concepts in this course if the time is taken to think about them and advantage is taken of help provided. Seek help in understanding from your peers, your TA, your professor, the Web. If stuck, formulate a question and ask it.

These concepts are too simple. I already know this stuff. Don’t be overconfident. The concepts in this course can be subtly deep. If you truly believe, based on the syllabus, that you know all this stuff, then … take a different class!

The material is too boring. I can’t get interested in it. This just means you have not thought about things deeply enough yet. Everything is interesting when examined closely, because everything is infinitely more elaborate and nuanced as you go deeper into it. Things are only simple and potentially boring on their surfaces. Probe deeper!
Assessment:

Your grade will be based on the quality of your writing, thinking and speaking during class and outside of it. The course is graded on a Pass/Fail basis only. I am primarily concerned that you make a good effort in the course and that you make progress in your ability to think and write intelligently about science. Preparation is key!

It is very important that you do the assigned reading and look at the assigned material prior to class. There will be weekly quizzes in class covering the reading that is due that week. It is less important that you get all the answers right than that you read the material, think about it, and attempt to apply the concepts in a thoughtful manner. Class discussion is for improving your understanding of the material and working on your ability to apply it and analyze its meaning. Class attendance is, of course, mandatory to success in the course.

Grade Calculation:

Writing assignments: 60%
Quizzes, Class Participation and Preparation: 40%

The minimum passing grade is a C-, which is roughly 70%.

Disability Resources:

Wesleyan University is committed to ensuring that all qualified students with disabilities are afforded an equal opportunity to participate in and benefit from its programs and services. To receive accommodations, a student must have a documented disability as defined by Section 504 of the Rehabilitation Act of 1973 and the ADA Amendments Act of 2008, and provide documentation of the disability. Since accommodations may require early planning and generally are not provided retroactively, please contact Disability Resources as soon as possible. If you believe that you need accommodations for a disability, please contact Dean Patey in Disability Resources, located in North College, Room 021, or call 860/685-5581 for an appointment to discuss your needs and the process for requesting accommodations.