ASTR210: FOUNDATIONS OF ASTRONOMY
Spring 2025
Syllabus

1 OVERVIEW

Important note: Please see emails and announcements near the start of term for information that may supercede the following.

- Time: Tues. & Thurs. 13:30 - 14:45
- Location: WAT 415 and online via Zoom (ID: 940 1336 0830, PW: Kilohoku77)
- Course materials: on Laulima. This includes lecture slides and all handouts.
- Instructor: Duncan Farrah, dfarrah@hawaii.edu
- Office hours: by appointment.
- : TA: Athena Engholm ae39@hawaii.edu
- Astronomy TAs are also available to help you. Communal Astro TA office hours will be announced shortly
- Prerequisite: ASTR110, and PHYS 151 or PHYS 170

2 COURSE DESCRIPTION

This is a one-semester class designed to introduce you to astronomical concepts while incorporating basic physics and math. It is designed for science and engineering students with an interest in astronomy, and for students in the BA Astronomy major.

I will assume that you are comfortable with basic algebra and scientific notation, and will help you if this is not the case. I will assume that you have the foundational astronomical knowledge from ASTR110, upon which we will build in this class. These goals will be achieved through a combination of lecture, in-class activities, discussion, and group work.

3 SCHEDULE OF TOPICS

The schedule may change based on our progress and student interests. Readings and assignments will be posted on Laulima.

- Overview and the night sky
- A short history of observing the night sky
- What is science? The scientific methods
- Some fundamental physics

- Planets and the solar system
- Exoplanets
- Stars
- Galaxies
- Cosmology

4 ASSESSMENT

Course grades will be determined based on the following contributions. These contributions may be adjusted as the semester progresses.

- Homework: 40%
- Semester project: 40%
- In class activities: 20%

Any late submission will only be allowed without penalty for officially sanctioned university activities or reasons, or serious other circumstances. Otherwise, submission beyond due dates will receive diminished or zero credit. If you are in any doubt, talk to Dr. Farrah.

The use of online testbanks, including but not limited to Chegg, Coursehero, Slader, for ANY PURPOSE AT ALL, is considered cheating. Any student found using such sites will receive a failing grade, and be referred to the OJA with a recommendation to take further action.

5 ASSESSD COMPONTNTS

Homeworks will be assigned every 1-2 weeks. They will consist of a series of questions or exercises. They will appear on Laulima.

Semester project details will be announced by the end of February.

In class activities include participation credit and quizzes. Participation Credit can be obtained by completing the following. First, attend all classes other than those you have a good reason for missing. Second, attend 5 or more office hours and asj me a question per office hour. We may also have occasional unannounced short quizzes in class. Missed quizzes may NOT be made up and will be counted as a score of zero unless your absence is excused IN ADVANCE.

6 STUDENT LEARNING OUTCOMES

In general, this course will help students develop tools to:

1. Engage in Critical Inquiry – Systematic questioning and analysis of problems, issues, and claims.
2. Develop Quantitative Literacy and Symbolic Reasoning – Applying mathematical, statistical, and symbolic reasoning to complex problems and decision making.

For astronomy specifically, students will be able to, using appropriate astronomical terminology and mathematical equations:

1. Explain coordinate systems (celestial sphere and local sky), describe the apparent motions of the Sun, Moon, planets, and stars, and explain the origin of seasons & moon phases.
2. Describe the basic methods used to determine distances in astronomy, including parallax and standard candles (supernovae Ia, Cepheids).
3. Demonstrate an understanding of basic physical laws (Newton's laws of motion and gravity, conservation laws, etc.) and their application in astronomy.
4. Demonstrate an understanding of the electromagnetic spectrum, the interaction of light and matter, and the origin of different types of spectra, especially in relation to understanding astronomical objects.
5. Demonstrate an understanding of the meaning of algebraic equations as they relate to physics principles, and an ability to use them to solve problems.
6. Describe the overall life cycles of different masses of stars, from birth to death and beyond,including the fundamental physical principles underlying energy production and the late stages of a star's life.
7. Describe the components of a galaxy, the various types of galaxies, and the various large scale processes such as star formation in galaxies.
8. Describe the overall history and basic composition of the Universe, including dark matter and dark energy, as well as how scientists have arrived at this understanding.

7 EQUIPMENT AND MATERIALS

THERE IS NO TEXTBOOK. Course notes will be provided, as will all lecture slides. You can and should use the FREE online "text" at http://www.astronomynotes.com as a resource.

If you feel the need to have a textbook: An Introduction to Modern Astrophysics, by B.W. Carroll and D.A. Ostlie, Addison-Wesley pub. is a comprehensive general astrophysics text for the junior/senior level and is a good book if you are planning to continue on to one of our degrees in astronomy/astrophysics. Another option is Astronomy: A Physical Perspective, by M. L. Kutner.

8 ATTENDANCE

This class will involve activities and discussion during regular class hours. Therefore, attendance and participation are extremely important!

Unexcused absences: I will NOT take regular attendance. However, I will know if you are absent regularly by your missed in-class work and quizzes. REMEMBER - missed quizzes and in-class activities can NOT be made up unless your absence is excused in advance.

Excused absences: Absences due to personal or family emergencies or academic activities may be excused. If you know in advance that you will miss a class, you must contact me before that class. Do NOT wait until the next class. I will arrange some way for you to make up the missed activities or provide an alternate assignment. If you do not contact me in advance, your absence will count as unexcused unless a true emergency prevented you from reaching me.

9 SPECIAL ACCOMMODATIONS

There are two resources available for students who may require special accommodations; the KOKUA Program, and the Counseling and Student Development Center.

The KOKUA program (http://hawaii.edu/kokua/) is the UH Mānoa office for students with disabilities. They serve undergraduate, graduate and professional students with learning, physical, psychiatric and other documented disabilities. Students with special needs or circumstances who have not already done so should contact the KOKUA program as soon as possible. Students who have accommodations from the KOKUA program should contact Dr. Farrah as soon as possible. In general, if you are a student with special needs or circumstances, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please make an appointment to see Dr. Farrah as soon as possible during office hours. All discussions will be treated with the strictest confidence.

The Counseling and Student Development Center (http://www.manoa.hawaii.edu/counseling/, (808) 956-7927) offers counseling services to students no matter what is troubling them. These services include individual counseling, group counseling, couples therapy, and career counseling. If you are feeling stressed or overwhelmed, or struggling to deal with events in your personal or family life, then the CSDC is here to help. Feeling stressed and overwhelmed when you first come to university, or even after having been here for a few years, is common, and there are people and resources to help you through. Steps can also be taken to help minimize the impact of life events on academic performance. Counseling sessions are treated in the strictest confidence. If you wish, you can also discuss anything along these lines with Prof. Farrah, again in strict confidence

10 THE UH STUDENT CONDUCT CODE

The purposes of the University of Hawaii are to give thorough instruction, conduct research and disseminate knowledge in and of branches of advanced learning as prescribed by its Board of Regents. The University is committed to ensuring a safe, civil, learning and working environment in which the dignity of every individual is respected. All members of the University community-students, faculty and staff - share responsibility for its growth and continued welfare.

Choosing to join the University community obligates each student to abide by this code of conduct. By enrolling in the University, students accept the responsibility to become fully acquainted with the University's regulations and to comply with the University's authority. The University expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to respect the rights, privileges, and property of others; and to observe national, state, and local laws and University regulations.

The University views the disciplinary process as a learning experience which aims to promote growth and understanding of one's responsibilities and privileges within the University environment. To this end, the disciplinary process attempts to balance an understanding and knowledge of students and their needs with the needs of the academic community. Pursuit of a college education provides an opportunity for exploration of new ideas, experimentation, self-examination, formation of new relationships, and development of ideals and direction. However, the University does not absolve students from accepting responsibility for their behavior in their pursuit of a college education. Rather, it reaffirms the principle of student freedom that is coupled with an acceptance of responsibility for one's actions and the consequences of such actions.

1. CHEATING Cheating includes the intentional use of unauthorized materials, information, notes, study aids or other devices or materials in any academic exercise, or attempts thereof.

2. PLAGIARISM Plagiarism includes the copying of the language, structure, programming, computer code, ideas, and/or thoughts of another and passing off the same as one's own original work, or attempts thereof.

3. FALSIFICATION Falsification includes the statement of any untruth, either verbally or in writing, with respect to any element of one's academic work, or attempts thereof.

4. FABRICATION Fabrication includes making up data and results, and recording or reporting them, or submitting fabricated documents, or attempts thereof.

5. MULTIPLE SUBMISSION Multiple submission involves the submission for credit—without authorization of the instructor receiving the work—of substantial portions of any work (including oral reports) previously submitted for credit at any academic institution, or attempts thereof.

6. COMPLICITY Complicity includes intentionally helping another to engage in an act of academic misconduct, or attempts thereof.

While everyone understands what the conduct code means on quizzes and exams, there is confusion on what it means for homework. Students are encouraged to work together on homework, but your write-ups and web submissions must be independent. Copying, whether by hand or cut-and-paste on your computer constitutes cheating.

The best way to ensure you understand the assigned material is to split off from the group when writing up or submitting your answers. If you copy text or other information from any source for any reason, you must include a citation to that source

When in doubt about plagiarism, paraphrasing, quoting, or collaboration, consult with Prof. Farrah before submitting your work.

11 DISCRIMINATION AND HARASSMENT

The diversity of students and staff that contribute to this class is a core strength that is critical to its educational mission. Every member of the class is expected to contribute to an inclusive and respectful culture. Dimensions of diversity can include sex, race, age, national origin, ethnicity, gender identity and expression, intellectual and physical ability, sexual orientation, income, faith and non-faith perspectives, socio-economic status, political ideology, education, primary language, family status, military experience, cognitive style, and communication style. The individual intersection of these experiences and characteristics build to form a valuable and positive educational environment. If there are aspects of the design, instruction, and/or experiences within this course that result in barriers to your inclusion or accurate assessment of achievement, please notify Dr. Farrah as soon as possible. Any student who believes they have been subject to discrimination or harassment on any of these grounds should contact the relevant university body. A complete listing is available at: http://manoa.hawaii.edu/dps/support.html. They may also contact Dr Farrah.

12 A NOTE ON TITLE IX

UHM is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know experiences any of these, UHM has staff and resources on campus to support and assist you. Staff also can direct you to resources in the community. Here are some:

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, contact the Counseling & Student Development Center: (808) 956-7927 or manoa.hawaii.edu/counseling/

Other resources:

- Office of Gender Equity: (808) 956-9499 or geneq@hawaii.edu
- Lesbian, Gay, Bisexual, Transgender, Queer (LGBTQ+) Center (808) 956-9250 manoa.hawaii.edu/lgbt
- Respondent Support (808) 956-4392 PAUrs@hawaii.edu
- Student Parents at Manoa (SP@M): (808) 956-8059 manoa.hawaii.edu/studentparents/
- UH Confidential Advocacy: (Natalia Villegas) (808) 341-4952 or nataliat@hawaii.edu
- University Health Services Manoa: (808) 956-8965 or hawaii.edu/shs/

If you wish to REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact:

Dee Uwono
Director and Title IX Coordinator
Hawaii Hall 124
2500 Campus Road
Honolulu, HI 96822
(808) 956-2299
t9uhm@hawaii.edu

As a member of the University faculty, I am required to immediately report any incident of sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and I cannot guarantee confidentiality, you will still have options about how your case will be handled. My goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need. For more information regarding sex discrimination and gender-based violence, the University's Title IX resources and the University's Policy, EP 1.204, go to: http://www.manoa.hawaii.edu/titleix/