

ASTR110

SURVEY OF ASTRONOMY

Fall 2018

This course is a conceptual and basic quantitative introduction to the principles and applications of modern astronomy. It covers the nature of science as applied to astronomy, the unfolding of human understanding about the Universe, the origin and evolution of planetary systems, and selected other topics.

Practical Details

When/where: MWF, WAT 112

Instructor of Record: Duncan Farrah (dfarrah@hawaii.edu)

Office: WAT 401

Office Hours: Mon 12-2pm, Tue 4:30-6pm, or by appointment (send an email to arrange)

TA: Ellis Avallone, email and office hours TBA

Class website: <http://laulima.hawaii.edu>

Prerequisites: None

Mathematical content: Algebra and basic geometry. No calculus.

Grading: Homeworks, in-class questions, two projects, one final

Questions?

For questions about class administration, grading, policies, procedures, and practical matters such as accessing MasteringAstronomy, **first read this document carefully**. If your question/issue is still not resolved, then contact Dr Farrah or Ellis Avallone.

For science questions, come to Dr. Farrah's or the TA's office hours. Students are strongly encouraged to come to office hours to ask science questions. **There is a small amount of extra credit available for doing so**. Office hours are especially useful if you run into any difficulties following the material or keeping up with assignments – we're here to help!

Course Materials

Please read the following *very carefully*. There are two required components for this course:

MasteringAstronomy: Access to the Mastering Astronomy online homework service. When registering, you must give the correct course code. Access to Mastering is available:

1. as part of bundle at UHM bookstore, or
2. online at <http://masteringastronomy.com> (you must select the correct textbook)

Textbook: The Cosmic Perspective Fundamentals 2nd ed. by Bennett et al. Available:

1. as part of bundle at UHM bookstore, or
2. online at <http://masteringastronomy.com> when purchasing access to Mastering.

Information regarding registering for MasteringAstronomy will be sent to the class via an email.

The course covers material in the textbook, together with a selection of additions and other topics. **Some material we cover in this course is not in the textbook.** Unless otherwise stated, **all material presented in class is examinable.**

Grading

Homeworks (50% of course grade) – weekly homeworks will be set on MasteringAstronomy, starting in week 2. Homeworks are due at 3:30pm on the set date. **The first two homework grades will be downweighted** (but still count) to allow students to get into the flow of the course with minimal impact. In addition, **the lowest homework grade will be dropped.**

“In-class” questions (20% of course grade) – Starting in week 2, 2-3 multiple-choice questions will be given in each class. These questions will *sometimes* cover material in the textbook, set as part of the reading from previous classes, but may cover any topic, including general knowledge of astronomy, physical reasoning, and “interesting problems”.

The “in-class” questions will be organized as follows:

- Approximately 30 minutes before each class, a quiz will open on Laulima, containing the questions.
- At points during class, the questions will appear on a slide, in the style of a clicker question. 2-3 minutes will be given in-class to discuss each question
- After those 2-3 minutes, answers will be given by show of hands, or paper voting
- After this, the correct answer will be given, along with the reasoning behind the correct answer
- Shortly after class, the quiz on Canvas will close
- Students may answer the questions at any point while the quiz is open

It is thus not strictly necessary to come to class to do the “in-class” questions, but there is a large strategic advantage in coming to class. Moreover, in some cases the questions will be a little challenging, such that the in-class discussions are very valuable. **The reasoning behind the correct answer is much more important than getting the answer correct.** A correct answer is worth four points, while a wrong answer is worth one point, **so you get marks just for participating.**

Communicating the answers to someone outside class, while in-class, is considered cheating. Communicating the answers to anyone who did not attend the relevant class is considered cheating.

Semester project (20% of course grade) – This is a two-part project:

- Part One must be submitted by 1159pm on Friday October 12th
- Part Two must be submitted by 1159pm on Friday November 30th

If you submit your project more than two weeks early then you get a 5% bonus mark, and if you submit more than one week early then you get a 2.5% bonus mark. Some important policies for the project reports:

- **All projects must be submitted electronically, as a pdf or a doc file.** You may not hand in physical copies.
- The report **must be typed** and at least four but no more than five pages of text - 11 point font, Times New Roman or something similar to it, single spaced.
- In addition to the pages of text it must also include relevant references, and may optionally include figures. You may use the citation style of your choice.
- The report should include your own research from articles and sources. You must cite primary sources, NOT resources such as Wikipedia.
- **You must write in your own words.** Cutting and pasting from the internet, any electronic or printed resource, or copying each other's work, is plagiarism and is considered cheating.

The two parts are:

Part One - Choose one of the following options:

- Pick a science fiction movie and write a report describing the movie's setting and its scientific accuracy (or lack thereof). **You may choose from any of the following movies:** *Interstellar*; *2001 a Space Odyssey*; *Metropolis*; *Solaris (1972 or 2002)*; *Contact*; *Blade Runner*; *Primer (2004)*; *The Martian*; *Predestination*; *Moon*
- Review the impact that observations of the sky had on any one of the following *ancient civilizations*: the Egyptians, Greeks, Mayans, Aztecs. You may discuss the impact in terms of day-to-day life, religion, scientific advancement, or a mixture of the three.
- Discuss any *two* practical spinoffs from space exploration programs in terms of their impact on modern day-to-day life.
- *Science vs. pseudoscience* – Pick any **one** pseudoscience from the two below and write a report describing what it is, why it is considered pseudoscience, how it can be falsified, and why some people continue to believe in it:
 1. *Beneath the comfortless cold moon* - the belief that the full moon has a profound effect on human behavior, including fertility, hospital admissions, and mental health.

2. *The stars my automation* - the belief that astrology, in which the positions of celestial objects in the sky at a person's birth are used to read their future, has any ability to predict events or human behavior patterns.
- *What is normal, anyway?* Describe and discuss the idea of "Normal Science" – the idea that scientific advancements via socially constructed paradigm shifts in understanding and perception. Then, briefly review the emergence of "post-Normal science" over the last two decades.

Part Two. Choose one of the following two options:

- *New Horizons, Different Worlds* – Describe the main scientific results from the New Horizons mission. This should include a brief introduction to New Horizons itself, but the main focus should be the results it obtained, and how our knowledge of Pluto and other Kuiper belt objects has advanced because of them. Then, address the following question: *what would the implications be if New Horizons had instead found that Pluto was a single large ball of basaltic achondrite rock, with little to no ice?* **This latter part is equal in importance to the first part.**
- *Year of the comet:* Describe the main results of the Rosetta/Philae mission to comet 67P. This should include a brief introduction to Rosetta/Philae, but the main focus should be the results it obtained, and how our knowledge of comets in general has advanced because of them. Then, address the following question: *What would the implications be if the water found on comet 67P by Rosetta had the same Hydrogen/Deuterium ratio to water on Earth?* **This latter part is equal in importance to the first part.**

Final Exam: 10% of course grade

Grade curving policy:

- a) If the final class average is less than a B minus, the grades will be curved such that the average will be a B minus.
- b) In the more likely event that the class average is higher than B minus, **there will be no curving down of grades**

Late submission – Any late submission (homeworks or project) will only be allowed without penalty for officially sanctioned university activities or reasons. Otherwise, half credit will be given up to 48 hours after the due date. Submission beyond 48 hours from the due date will receive zero credit. If you are in any doubt, talk to Dr. Farrah

Semester project Grading Rubric

Each part of the semester project will be graded according to the following rubric:

CATEGORY	4	3	2	1
Introduction	The introduction is inviting, states the main topic and previews the structure of the paper.	The introduction clearly states the main topic and previews the structure of the paper, but is not particularly inviting to the reader.	The introduction states the main topic, but does not adequately preview the structure of the paper nor is it particularly inviting to the reader.	There is no clear introduction of the main topic or structure of the paper.
Focus on Topic	There is one clear, well-focused topic. Main idea stands out and is supported by detailed information.	Main idea is clear but the supporting information is general.	Main idea is somewhat clear but there is a need for more supporting information.	The main idea is not clear. There is a seemingly random collection of information.
Support for Topic	Relevant, telling, quality details give the reader important information that goes beyond the obvious or predictable.	Supporting details and information are relevant, but one key issue or portion of the storyline is unsupported.	Supporting details and information are relevant, but several key issues or portions of the storyline are unsupported.	Supporting details and information are typically unclear or not related to the topic.
Accuracy of Facts	All supportive facts are reported accurately.	Almost all supportive facts are reported accurately.	Most supportive facts are reported accurately.	NO facts are reported OR most are inaccurately reported.
Pacing	The pacing is well-controlled. The writer knows when to slow down and elaborate, and when to pick up the pace and move on.	The pacing is generally well-controlled but the writer occasionally does not elaborate enough.	The pacing is generally well-controlled but the writer sometimes repeats the same point over and over, or spends too much time on details that don't matter.	The pacing often feels awkward. The writer elaborates when there is little need, and then leaves out necessary information.
Sequencing	Details are placed in a logical order and the way they are presented effectively keeps the interest of the reader.	Details are placed in a logical order, but the way in which they are presented/introduced sometimes makes the writing less interesting.	Some details are not in a logical or expected order, and this distracts the reader.	Many details are not in a logical or expected order. There is little sense that the writing is organized.
Sentence Structure	All sentences are well-constructed with varied structure.	Most sentences are well-constructed with varied structure.	Most sentences are well-constructed but have a similar structure.	Sentences lack structure and appear incomplete or rambling.
Capitalization & Punctuation	Writer makes no errors in capitalization or punctuation, so the paper is easy to read.	Writer makes 1 or 2 errors in capitalization or punctuation, but the paper is still easy to read.	Writer makes a few errors in capitalization and/or punctuation that catch the reader's attention and interrupt the flow.	Writer makes several errors in capitalization and/or punctuation that catch the reader's attention and greatly interrupt the flow.

Grammar & Spelling	Writer makes no errors in grammar or spelling that distract the reader from the content.	Writer makes 1-2 errors in grammar or spelling that distract the reader from the content.	Writer makes 3-4 errors in grammar or spelling that distract the reader from the content.	Writer makes more than 4 errors in grammar or spelling that distract the reader from the content.
Sentence Length	Every paragraph has sentences that vary in length.	Almost all paragraphs have sentences that vary in length.	Some sentences vary in length.	Sentences rarely vary in length.
Conclusion	The conclusion is strong and leaves the reader with a feeling that they understand what the writer is \"getting at.\"	The conclusion is recognizable and ties up almost all the loose ends.	The conclusion is recognizable, but does not tie up several loose ends.	There is no clear conclusion, the paper just ends.
Sources (Content)	All sources used for quotes and facts are credible and cited correctly.	All sources used for quotes and facts are credible and most are cited correctly.	Most sources used for quotes and facts are credible and cited correctly.	Many sources used for quotes and facts are less than credible (suspect) and/or are not cited correctly.

Extra Credit

There is extra credit available in this course:

Office hours: Coming to office hours is an invaluable way to learn and discuss the course material in a small group or even one-to-one setting. They are an extraordinarily useful resource for all students, especially those from non-science backgrounds. To encourage more students to make use of office hours, the following is available. **For the easiest 2% extra credit you will ever receive**, simply do the following:

1. Come to an office hour
2. Introduce yourself!
3. Tell me one interesting/notable/boring thing about yourself
4. On a post-it note or other piece of paper, write or draw something that in some way pertains to astronomy (as very loosely interpreted). These papers will be placed on a noticeboard, to form an increasing tapestry of contributions as the semester progresses.

Extra credit for coming to an office hour can be achieved once and only once, and must be done by the end of October.

Class Policies

Students and faculty each are responsible for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to define a reasonable space within which they and the students express opinions. Professional courtesy and

sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender identity, and nationality.

For the benefit of your fellow students and your instructor, you are expected to practice common courtesy with regard to all course interactions. For example:

- **Act as mature and responsible adults at all times.**
- **The use of cell phones is not allowed during class.** Ringer volume must be set to silent before class starts.
- **In this large class, talking to your neighbor, even very quietly and briefly, is very disruptive.** Offenders will be asked to leave class. Students are actively encouraged to ask talkative neighbors to be quiet.
- **Laptops can only be used for class related issues (no Facebook, web-surfing, Netflix, etc.) and must have their volume set to completely silent.** Students should be aware that their laptop screens are clearly visible to those sitting behind them, so they should refrain from displaying personal, distracting or otherwise embarrassing material.
- **Show up to class on time, and be prepared to learn when class starts.**
- **Do not leave class early and do not start packing up before class is dismissed.**
- **If you must arrive late or leave early, inform Dr. Farrah in advance.**

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.

The UH Student Conduct Code

The purposes of the University of Hawai'i 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.

Violations of the Conduct Code may include:

A. 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.

B. 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.

C. 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.

D. FABRICATION

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

E. 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.

F. COMPLICITY

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

G. VIOLATION OF UNIVERSITY, COLLEGE, DEPARTMENTAL, PROGRAM, COURSE, OR FACULTY RULES

The violation of any University, College, Departmental, Program, Course, or Faculty Rules relating to academic matters that may lead to an unfair academic advantage by the student violating the rule(s).

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 use of online testbank answers 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 Duncan Farrah before submitting your work.

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.

A Special Note on Title IX

Title IX of the Education Amendments (1972) prohibits discrimination on the basis of sex in any educational program or activity that receives federal financial assistance (20 U.S.C. § 1681(a)). Title IX prohibits sexual harassment. This includes sexual assault, sexual violence, relationship (domestic /dating) violence, stalking or other sexual misconduct. Further details can be found at: <https://manoa.hawaii.edu/titleix/>

The Violence Against Women (VAWA) Reauthorization Act (2013), also prohibits sexual assault, domestic violence, dating violence, and stalking. This federal legislation is sometimes referred to as the Campus Sexual Violence Elimination (SaVE) Act.

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. The University of Hawai'i is required by Federal Law to handle such assault cases.

If you or someone you know has been harassed or assaulted, then please contact the UH Title IX coordinator, via: <https://manoa.hawaii.edu/titleix/>

You may also contact Dr. Farrah.

Some external resources on Title IX (their inclusion here is not intended as any form of formal endorsement):

<http://knowyourix.org/>

<http://endrapeoncampus.org/>

<http://survjustice.org/>

<http://clerycenter.org/>

<https://www.notalone.gov/>