

## ASTR250: Observational Astronomy

Spring 2016: January 11–May 13  
TR 2:00 PM–3:15 PM, Room: STB 225

Version 1: January 2, 2016 (subject to change)

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**Instructor:** Kathy Cooksey, Ph.D., STB 219; kcooksey@hawaii.edu; 808-932-7195  
**Office Hours:** MT 1–2 PM, W 3–4 PM, and by appointment  
**Websites:** Laulima ASTR-250-001 (HIL.10518.SP16)  
**Textbook:** *To Measure the Sky, 3rd Ed.* by Chromey

### Course Description:

The course catalog description: “An introduction to the tools and techniques of observational astronomy: astronomical time and coordinate systems, photometric systems and magnitudes, principles of telescopes and their operation, introduction to modern astronomical instruments, analysis of astronomical data. Coursework includes observations with small telescopes, and tours of the observatories on Mauna Kea.”

Notes: To observe with small telescopes, enroll in ASTR250L. There is no guarantee we will tour Maunakea Observatories this semester.

**Pre-requisites:** ASTR180, ASTR181, MATH205, PHYS171

### Learning Objectives:

- Acquire a general overview of observational astronomy principles and techniques.
- Acquire a detailed understanding of the main tools used for visible and near-IR astronomy.
- Become familiar with modern data acquisition, analysis, and data mining.

### Email, Textbook, and Websites:

- UHH considers email and Laulima an official form of communication; students are responsible for receiving and returning information in a timely manner.
- The professor will email students at their [hawaii.edu](http://hawaii.edu) accounts only.
- The required textbook is *To Measure the Sky—An Introduction to Observational Astronomy 3rd. Ed.* by Chromey.
- The Laulima course website is listed under ASTR-250-001 (HIL.10518.SP16). This site will be the hub for all course information.

### Class Rules:

- Students are responsible for their own learning, which includes preparing for class, submitting work, asking questions, and seeking additional help.
- Students must respect and support of their peers’ learning, which means helping each other with difficult concepts but not just giving the answer.
- Students need to convey (either in person, by email, through an intermediary, or somehow) to the professor questions, comments, and concerns about the course.
- The professor will be receptive to and respectful of the students’ needs and interests and should generally follow the class rules as detailed for the students (also see next section).
- Group work is encouraged in class and for homework assignments. However, all submitted work must be the original work of the student with reference to any homework partners.

- All references (e.g., websites, books other than the official course textbook, etc.) used to complete assignments must be cited, including numbers, techniques, facts, etc.
- Sign in each class on the attendance sheet.
- A non-smart-phone calculator is required for every class. Students should practice with the calculator they will use for quizzes and the final exam.
- Solutions to problems must show sufficient supporting work to receive full points.

### Good-to-Know about the Professor:

- She enjoys teaching and wants to be better at it, and she really cares about helping students be better. These aspects combined mean she is on the students' side; trust in that and knowledge that she is receptive to feedback will smooth over rough patches.
- She chooses teaching techniques based on physics-education research to support student learning as best as possible. This means she has one or more reasons for nearly every component of and action in a course. She'll gladly motivate these choices whenever necessary or asked.
- Her primary goal is to help students improve *how* they learn with the logic that if students learn how to learn, they can master any content. The related goal is to focus on transferrable skills so that time and effort spent for the class yield benefits beyond the course and semester.
- Generally, she does not answer questions directly. A student making connections and constructing a solution her- or himself will ingrain the answer more effectively, and the professor facilitates the process by asking leading questions. Since the motivation is to help the students, they should embrace and engage with this process. (It is also a transferrable skill to discuss ideas and answer questions on the fly.)
- She designs quizzes and exams so that no one gets 100% and no one gets 0% because either score would not be useful in assessing what the students understand and how to help. The rule-of-thumb is to score above the median (see Grading below). She has no interest in failing students who make good-faith effort in the class (e.g., good attendance, submit completed work, ask questions in and out of class).
- She thinks no single resource is comprehensive, so the expectation is that the student will have to work with the professor, her materials, the textbook, and the wealth of material available on the internet.
- The expectation is that a course requires 2–3 hr outside-of-class time per credit per week.. Hence a 15-cr semester equals 30–45 hr per week (i.e., a full-time job).
- She generally responds to email 24-to-48 hours after receipt. If the matter is urgent, the student should call or stop by her office.

### General Course Outline

The schedule given in the table below is highly likely to change. Significant changes will be announced on the Laulima course website, and the new copy of the syllabus will be there, under Resources.

Students are expected to read the textbook section(s) before class. The “lectures” will rely on students having given a good faith effort to understanding the material. It is assumed that the students will read the brief introduction to each chapter, no matter the number of sections actually assigned.

Homework (in *italics*) are due every two weeks, on Thursdays, at class time. Quizzes are given after the homework covering the same topic have been returned (to give a chance for review), but all previous material is fair game.

| Date                          | Topic  | Activity   |
|-------------------------------|--|--|
| T 12 Jan<br>R 14 Jan          | L1. ASTR250 overview<br>L2. Light (§1.1–1.6)   | Pre-quiz   |
| T 19 Jan<br>R 21 Jan          | L3. Uncertainty I (§2.1–2.3)<br>L4. Uncertainty II                                   | <i>HW #1: “Light I &amp; Error Analysis I” assigned (due R 4 Feb)</i>  |
| T 26 Jan<br>R 28 Jan          | L5. Uncertainty III (§2.3–2.6)<br>L6. Place, Time, & Motion I (§3.1)                 |  |
| T 2 Feb<br>R 4 Feb            | L7. Place, Time & Motion II (§3.2–3.4)<br>L8. Name, Catalogs, & Databases (§4.1–4.6) | <i>HW #2: “Error Analysis II &amp; Celestial Motion” assigned (due R 18 Feb)</i>   |
| T 9 Feb<br>R 11 Feb           | L9. Optics I (§5.1–5.2)<br>L10. Optics II  |  |
| T 16 Feb<br>R 18 Feb          | L11. Optics III (§5.3–5.5)<br>L12. Optics IV   | <i>HW #3: “Optics I” assigned (due R 3 Mar)</i>  |
| T 23 Feb<br>R 25 Feb          | L13. Telescopes I (§6.1–6.3)   | Quiz #1 [HW #1]  |
| T 1 Mar<br>R 3 Mar            | L14. Telescopes II (§6.4–6.6)<br>L15. Telescopes III                                 | <i>Laulima survey: Mid-course evaluation (due R 8 Mar)</i><br><i>HW #4: “Optics II &amp; Telescopes I” assigned (due R 17 Mar)</i> |
| T 8 Mar<br>R 10 Mar           | L16. Telescopes IV<br>L17. Matter and Light I (§7.1, 7.3, 7.5)                       |  |
| T 15 Mar<br>R 17 Mar          | L18. Matter and Light II<br>L19. Detectors I (§8.1–8.2)                              | <i>HW #5: “Telescopes II &amp; Light II” assigned (due R 31 Mar)</i>   |
| 21–25 Mar                     | Spring Recess (no class)   |  |
| T 29 Mar<br>R 31 Mar          | L20. Detectors II  | Quiz #2 [HW #2 & 3]<br><i>HW #6: “Light III &amp; Detectors I” assigned (due R 14 Apr)</i>   |
| T 5 Apr<br>W 6 Apr<br>R 7 Apr | L21. Detectors III (§8.2 end, 8.4)<br>L22. Detectors IV                              | Visit remote observers on Keck I in Waimea (tentative)   |
| T 12 Apr<br>R 14 Apr          | L23. Digital Imaging I (§9.1–9.3)  | All-day Maunakea summit trip (tentative)<br><i>HW #7: “Detectors II &amp; Digital Imaging” assigned (due R 28 Apr)</i>             |
| T 19 Apr<br>R 21 Apr          | L24. Digital Imaging II (§9.4–9.6)<br>L25. Photometry (§10.1–10.4)                   |  |
| T 26 Apr<br>R 28 Apr          | L26. Spectroscopy (§11.1–11.2)   | Quiz #3 [HW #4 & 5]  |
| T 3 May<br>R 5 May            | L27. Course synthesis  | Course evaluations & post-quiz   |
| T 10 May                      | Final Exam   | 2:00 PM–4:00 PM  |

### Grading:

- The grade depends on the following items: homework assignments (35%); completing pre- and post-quizzes (5%); quizzes (40%); and the final exam (20%). The lowest homework grade will be dropped.
- There will be no make-up work other than the final exam.
  - If a student were excused, the graded work will not be included in her/his final grade.
  - If a student must miss a class for a reasonable reason, s/he must email the professor before the start of class time.
  - If a student were unable to email in advance due to extreme circumstances, s/he should contact the professor as soon as possible. Such instances will be judged on a case-by-case basis.

- If a student were excused from all points in a given category, the percentage of the other categories will be increased to fill the void.
- Homework assignments are never excused since their due dates are known in advance. It is the student's responsibility to turn in the homework somehow, either by giving it to another student to submit or by scanning and emailing it to the professor.
- Late homework is accepted within 24 hours of the deadline for 75% credit.
- Cheating is not tolerated. Any question of cheating will be tested with an oral exam, to see whether the student(s) involved understand the material.
- The final letter grade will be given based on the class statistics (e.g., the 25<sup>th</sup>, 50<sup>th</sup>/median, 75<sup>th</sup> percentiles). The goal is to score higher than the median on all graded work. The expectation is that final grades higher than the median will pass with at least a C and that the 25<sup>th</sup> to 50<sup>th</sup> percentiles will likely earn something in the C range.

**Disability Support:** Any student with a documented disability who would like to request accommodation should contact the University Disability Services Office at 932-7623 (V) or 932-7002 (TTY), as early in the semester as possible.

**Advising:** Advising is a very important resource designed to help students complete the requirements of the University and their individual majors. Students should consult with their advisor at least once a semester to decide on courses, check progress towards graduation, and discuss career options and other educational opportunities provided by UH Hilo. Advising is a shared responsibility, but students have final responsibility for meeting degree requirements.

**Kilohana Academic Success Center:** The KASC provides academic support opportunities for all UH Hilo students that foster their development into independent, self-motivated learners. Students who visit Kilohana have access to subject-specific and academic skills tutoring from UHH students selected for their academic achievement and dedication to helping others succeed. Kilohana is located on the lower level of the Mookini Library and on the web at <http://hilo.hawaii.edu/kilohana/>.

**Human Rights:** The University of Hawai'i at Hilo prohibits discrimination in its education programs based on race, national origin, color, creed, religion, sex, age, disability, veteran status, sexual orientation, gender identity or associational preference. If at any time during class you feel uncomfortable about what is being talked about, or feel that your human rights have been violated, please feel free to leave the room. However, the professor asks that you confer with her as soon as possible about what happened so that appropriate action can be taken if necessary to avoid future problems. If you are uncomfortable speaking with the professor about your concern, please contact Kalei Rapoza ([kaleihii@hawaii.edu](mailto:kaleihii@hawaii.edu)), Interim EEO/AA Director, at 932-7641.

**UH Hilo Sexual Assault Policy:** UH Hilo provides confidential assistance for victims of sexual assault. Counseling Services on-campus and the YWCA Sexual Support Services off-campus offer guidance regarding medical assistance and emotional help and can discuss options for reporting sexual assaults to law enforcement. All conversations are private and confidential. The UH Hilo Sexual Assault Policy can be found at: <http://hilo.hawaii.edu/uhh/vcsa/documents/UHHSexualAssaultPolicy.pdf> For assistance during the day, contact UH Hilo Counseling Services at (808) 932-7465; or, after hours and on weekends, contact the YWCA Sexual Assault Support Services at (808) 935-0677.

**Student Conduct:** Students are expected to follow the University of Hawai'i at Hilo Student Code of Conduct available at the following URL: <http://www.uhh.hawaii.edu/catalog/student-conduct-code.html>.