A105: Stars & Galaxies

Daily from 11:45 AM until 1:00 PM
Swain West Room 219
Section 1572

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General Introduction

Welcome to the exciting study of stars and galaxies! As stated in the official department description, this course will cover a wide variety of topics pertaining to a great many phenomena that have been observed across the visible Universe. In addition to simply providing you with curious facts, this class will also introduce you to the idea of astronomy as a science. By developing this theme, you may gain some deeper insight into what it is practitioners of the field actually do. Plus, since astronomy and astronomical findings tend to be highly appreciated by society, this course will help you gain a deeper understanding of why that is the case and how you can become more involved in it.

Materials

There is no required text for this course. *Pathways to Astronomy, volume 2: Stars & Galaxies* by Schneider and Arny is recommended as an external resource, but having it is not a necessity for this course. It should be readily available from a multitude of sources.

Requirements

Work for A105 comes in four flavors, described thusly:

- Projects
  - Over the course of the term, you will be asked to complete two separate projects. These are designed to expose you to some facets of astronomy not explicitly covered in class. Greater detail will be provided on each project over the duration of the class, but the general topics and due dates are:
    - You, Film, and the Universe, **Due Thursday, May 24th**
    - Observing the night sky, **Due Wednesday, June 13th**
  - Overall, these projects account for 18% of your final grade.

- Exams
  - There will be **two** exams for the class
    - A midterm examination is scheduled for **Tuesday, May 29th**. It will account for 19% of your final grade.
    - A **comprehensive** final is scheduled for **Thursday, June 14th**. It will account for 23% of your final grade.
  - Both exams will occur during normal scheduled class time
- Quizzes
  - Periodically, you will be given quizzes in class. These will be brief (10-20 questions) evaluations covering only the material that has been discussed in class since the prior quiz or exam.
  - The dates for each quiz are listed in the schedule section of this syllabus.
  - Averaged together, the quizzes will account for 19% of your grade.
- Lab assignments
  - Every Friday, there will be an in-class lab exercise, the details of which will be outlined in class. Naturally, you must be present in class to participate and get full credit. There will also be a homework component to the lab, which, coupled with the in-class portions, will be **due at the end of class on the following Tuesday.**
  - Labs will be grading on varying numerical scales, as outlined on each lab handout.
  - Averaged together, the labs will account for 21% of your grade

Recommendations

It is absolutely *imperative* that you come to class. The lectures are what the quizzes and exams will be based on, where labs will take place, and when everything is due, so good attendance works purely towards your benefit. Furthermore, since no text is required, failure to come to class could result in your not having *any* resources at your disposal. One should also keep in mind that a true understanding of the material can only really come from experiencing the various demonstrations, examples, and other materials I intend to present in class. Outside of the classroom, there are office hours! Please feel free to use them. Astronomers like talking about astronomy (that's why we do this), so if ever you have any questions, quandaries, or figments, please share.

Restrictions

Since there is much material to be discussed and to avoid a major backup in grading, it is important that all work be completed in a timely manner. Therefore, the following policies will be enforced **without exception**:

- Late projects will be accepted, but the grade will be decreased by 15% for each day that passes beyond the due date.

- Missed quizzes and exams can be made up without penalty **only if you notify me of your absence from class PRIOR to the scheduled time of the evaluation**. Otherwise, you will be permitted to make up the missed work, but you will receive only 60% of the score you earn.

- Should you wish to avoid a grade of an F, you must take both the midterm and the final. Failure to do so will, without exception, result in that which you are trying to avoid, i.e., a grade of an F.

- Regarding labs:

  - You must be in class on the day of a particular lab in order to complete the work that will be required of you. Unfortunately, due to the pace of the course and practical limitations, make-ups will not generally be possible. Obviously, should something horrific come up in your life, a solution may be found, but do not assume this to be the case!

  - Some parts of the labs will be collected at the end of the class. As with quizzes and exams, late labs will be accepted without penalty **only if you notify me of your absence from class PRIOR to the due date**. Otherwise, you will be permitted to turn in your work, but your grade will decrease by 15% for each day that passes beyond the due date.

- In general, electronic submissions of work are not acceptable. Work is due in class and in the appropriate format. Failure to meet these requirements will result in deductions.

- As per usual, you are expected to follow the IU standards of academic conduct. Therefore, unpleasantries such as cheating, plagiarism, etc., will not be tolerated or treated in a casual manner.

Schedule

Tuesday, May 8th: Introduction to the course and astronomy; sections 1.1-4.4
Wednesday, May 9th: Light I (blackbody radiation and spectra); sections 21.1-24.4
Thursday, May 10th: Light II (Doppler, light and distance, and magnitudes); sections 25.1 and 54.1-54.4
Friday, May 11th: **Lab: Spectroscopy**

Monday, May 14th: Physics of astronomy I (Forces and Energy); sections 14.1-15.3, 16.2, and 20.1; **Quiz 1**
Tuesday, May 15th: Physics of astronomy II (Momentum and Kepler's Laws); sections 12.2, 17.2, and 20.2
Wednesday, May 16th: Physics of astronomy III (the physics of stars); sections 50.1-50.4
Thursday, May 17th: Structure of the Sun; sections 49.1-49.6
Friday, May 18th: **Lab: Solar Motion**

Monday, May 21st: Stellar evolution; sections 59.1-62.4, 64.1-64.4, and 66.1-66.4
Tuesday, May 22nd: The H-R diagram; sections 58.1-58.3; **Quiz 2**
Wednesday, May 23rd: Binary systems; sections 56.1-56.3
Thursday, May 24th: Curious and interesting stars; sections 63.1-63.3 and 67.1-68.5; **Film project due**
Friday, May 25th: **Lab: Write your instructor's thesis**

Monday, May 28th: NO CLASS!
Tuesday, May 29th: ***Midterm Examination***
Wednesday, May 30th: Globular clusters; sections 69.1-69.3 and 70.3
Thursday, May 31st: Dark matter; sections 78.1-78.4
Friday, June 1st: **Lab: Investigating the unknown**

Monday, June 4th: Galaxy morphology and structure; sections 74.1-75.4
Tuesday, June 5th: Galactic dynamics; section 73.3
Wednesday, June 6th: The Milky Way; sections 70.1-73.2; **Quiz 3**
Thursday, June 7th: Curious and Interesting galaxies; sections 77.1-77.3
Friday, June 8th: **Lab: Create a galaxy**

Monday, June 11th: Cosmology I (Big Bang theory); sections 81.1-82.4
Tuesday, June 12th: Cosmology II (observational evidence); sections 79.1-80.4
Wednesday, June 13th: Space Exploration; lecture only; **Observing project due**
Thursday, June 14th: ***Final Examination***