Astronomy 98

Beginner’s Guide to the Universe

Fall 2020

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Instructor of Record: Jessica Lu

Time & Location: Monday 6:00-7:30PM PDT

Course Number: Astronomy 98

Units: 2 units, P/NP

Prerequisites: None

Course Description
Physics, broadly the study of motion and interaction in nature, captivates as much as it bemuses. As a centuries old “hot topic,” physics today is filled with thriving research in quantum information, cosmology, planetary astrophysics, nonlinear dynamics, and countless others subfields. Yet the subject is often cloaked with inaccessible jargon, with the big picture ideas obscured behind seemingly insurmountable prerequisites and confounding pseudoscience. In this class, we will qualitatively summarize the broad and vibrant landscape of physics as it is today.

Learning Objectives
At the close of the semester, the student will have the ability to critically assess physics as it appears in popular expositions. The student will recognize overarching themes within physics and will be able to make connections
between contemporary research in physics and astronomy and important fundamental ideas in these fields. The
student will be able to unify many unintuitive ideas and extreme phenomena in physics and astronomy with
everyday occurrences.

Enrollment

Students should enroll in the course through CalCentral. The relevant CCN will be published on the DeCal
website. Students are required to enroll in one of two discussion sections, as well as the lecture.

There are no prerequisites for this course. Though the course will contain some mathematical asides for
completeness, students will only be expected to understand the physics at a qualitative, conceptual level.
In general, this course will emphasize broad concepts and large results with little regard for mathematical
detail.

As such, this class should be accessible to all students of any year and major. Though there are no enrollment
restrictions, physics majors (especially upper division students) are slightly discouraged from taking this course
as it will generally reiterate concepts from the standard physics curriculum.
This course is affiliated with Democratic Education at Cal (DeCal, decal.berkeley.edu).

Grading

| Attendance | 35% |
| Participation | 20% |
| Homework | 15% |
| Final Paper | 30% |

A cumulative grade of 70% or above and a final paper submission is required to pass the class.

Attendance & Participation

The class has two components: lecture (for the exposition of new topics) and discussion (for extra topics and
dialogue).

Lectures will be recorded and can be watched whenever so both attendance and participation for lectures will
be graded on a weekly discussion post and response. Students will need to start a discussion post noting points
of interest or questions that came up on the lecture’s material as well as reply to at least another student’s
post.

Discussions will be live and attendance will be recorded. Participation in discussion will also be assessed
holistically based off of a student’s willingness to comment and participate. Note that attendance of discus-
sion sections is prerequisite to participation. Instructors should be notified by email of absences known in
advance. We understand that differences in time zones can make attending discussion difficult. We are willing to work with everybody’s situation and make accommodations for people where possible.

With the current situation of Covid-19, we intend on being as flexible and understanding with
everybody’s situation. As the situation changes throughout the semester, please note that the
rubric in which we grade attendance and participation grade will be subject to change.

Homework

Homework worksheets will be posted on BCourses at least one week in advance and will be due before the
lecture section on the Monday following the topical lecture, unless otherwise specified. Late homework without
an exemption will be accepted for a maximum of 50% credit up to a week late.
Final Paper

At the end of the semester, students will submit a final paper ∼ 1000 words (∼ 4 pages double-spaced) reviewing a topic of physics of the student’s choice. The paper should reflect an educated assessment of the given topic. In order to pass the class, a student must submit a final paper. A passing grade will not be awarded to any student who does not submit a final paper, regardless of their grade percentage in the class.

This assignment will be due via email by the end of the day on Monday, 7 December 2020 (during reading/review/recitation week).

Academic Misconduct

Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. While students are encouraged to cooperate and discuss assignments outside of class, they should write assignments separately reflective of their own effort and understanding. First violations will result in a zero on the assignment, and any subsequent violations may result in administrative action in accordance with the Berkeley Campus Code of Student Conduct.

Schedule

Below is a schedule of class meetings along with a (tentative) curriculum. Possible discussion times are shown in parentheses.

<table>
<thead>
<tr>
<th>week</th>
<th>meetings</th>
<th>topic</th>
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<tbody>
<tr>
<td>1</td>
<td>9/7</td>
<td>overview</td>
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<tr>
<td>2</td>
<td>9/14</td>
<td>classical dynamics</td>
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<tr>
<td>3</td>
<td>9/21</td>
<td>electromagnetism and optics</td>
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<tr>
<td>4</td>
<td>9/28</td>
<td>special relativity</td>
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<tr>
<td>5</td>
<td>10/5</td>
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<td>7</td>
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<tr>
<td>8</td>
<td>10/26</td>
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<tr>
<td>9</td>
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<td>review</td>
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<tr>
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<tr>
<td>11</td>
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<tr>
<td>12</td>
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<tr>
<td>13</td>
<td>11/30</td>
<td>special topics</td>
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Reading List

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<thead>
<tr>
<th>week</th>
<th>readings</th>
</tr>
</thead>
</table>
| 3    | ◇ Purcell, E. M., & Morrin, D. J. (n.d.). *Electricity and Magnetism*.  

The Imagine Team, NASA (n.d.). *Cosmic Times: 1919,* pp. 3-13


Liddle, A. (2003). *An Introduction to Modern Cosmology,* Chapters 4, 13

Retrieved from http://www.pitt.edu/~jdnorton/teaching/HPS_0410/chapters/quantum_theory_origins/
Feynman, R. P. (1963). *The Feynman Lectures on Physics, Volume III,* Chapters 1, 2


credit: Bill Watterson, *Calvin and Hobbes*