

ASTRO 120

The Big Bang Universe

Sample Syllabus

Description

Like Astro 001, this course has a central narrative, a story that we will follow as we cover different topics of cosmological interest. Our story has no relation to any you might have encountered in a previous webcourse. Here is a brief preview of our narrative context and setting: They say the future wasn't the one we wanted. But it was the one we deserved. The year is 2104. Kinsey Morales lives in a fractured world, one pummeled by a century of climate change, resource shortages, and political ineptitude. A history major at what once was Penn State, she marvels at the twentieth century's glossy, optimistic visions of the future, with alien contact and space travel and miraculous technologies catering to any conceivable whim. Her future has none of these things. How were they so wrong? Why is the Universe so wrong? Her search for answers brings Kinsey, a classmate, and two professors to the shadowy depths of Black Moshannon forest, the site of a secret, forgotten project. Their journey leads them through fabric of space and time, the depths of elusive black holes, and the grandest structures of the cosmic frontier. They travel to the beginning of space and to the end of time, from vibrant soup of creation, to the chilly plains of oblivion. In the end they learn that humanity's future is still in the cosmos. But not in a way anyone could have imagined.

Format

The semester divided into roughly 3-week periods for each of the five major units:

1. Life and Death in the Milky Way — The layout of the Milky Way Galaxy, distances within the Galaxy, the Fermi Paradox, the Galactic Habitable Zone 1
2. Warps in Space and Time — Properties of space and time, wormholes, time travel, relativity, black holes

3. The Dance of Galaxies — Other galaxies, dark matter, galaxy environments, galaxy evolution, the distance ladder
4. The Slow March of Time — dark energy, the fate of the universe, string theory, “Boltzmann brains”
5. Beginnings and Ends — cosmic microwave background, big bang cosmology, multiverses, holography, “alternative” cosmologies

You may work through the online material at whatever pace suits you, but be aware that at the end of each 3-week period, there will be an exam covering that unit's material. Exams will have 50 questions each, in multiple choice format. The exam after Unit 5 will be a cumulative, final exam of the same format (i.e., 5 exams total).

Requirements

The course content for this course is accompanied by a wealth of images. The Astro 120 Web course layout is optimized for a web browser window with at least a 850 x 600 pixels display area. Features in the course—images, movies, activities, questions, etc.—will require a browser with Javascript and CSS Style Sheets enabled. The current version of Firefox (for Mac OS or for Windows) is recommended. Cookies, Java, and JavaScript must be enabled. Due to nonstandard handling of CSS, JavaScript, and caching, we do not recommend using Internet Explorer as your browser.

You may need to turn off pop-up window blocking (some browsers distinguish between blocking all pop-up windows, and just “unwanted” pop-ups). If you find a link that says it would open a new window and it does not, please check your browser's settings.

Many movies are in Quicktime '.mov' and Shockwave/Flash '.swf' format. Some are in Windows Media '.wmv' format. Apple's Quicktime can be found at <http://www.apple.com/quicktime/download/> . Shockwave and Flash plug-ins can be found at <http://www.adobe.com/downloads/#players> . Windows Media Player can be found at <http://windows.microsoft.com/en-us/windows/download-windows-media-player> .

Penn State's ITS computer labs meet the technology requirements for this course. See <http://clc.its.psu.edu/Labs/> for information on locations

and hours of operation. Note: if you plan to access this course in a public computer lab, you might want to bring along a set of headphones.

Exams

The course material is presented online.

Each of the first four units of the course will have a 50-minute (non-proctored) exam devoted to its material. The 1-hour final exam will be a 50 question cumulative final exam, including the content of Unit 5. This exam will be scheduled during the usual final exam period for the semester and will be delivered through Canvas.

You may drop the lowest test score of the four unit exams. The cumulative final grade may not be dropped. Since one test may be dropped, there will be NO MAKEUP TESTS given except in the case of emergency. Emergencies must be documented by written proof.

You must complete the relevant material before the exam period begins. You can do this at your own pace and convenience; however, do be sure to allow enough time. It is probably best to do a bit each week, as opposed to leaving everything for the last day before the test period. In total, we expect about the same amount of your time to be required as in a traditional class. You will see many multiple choice questions dispersed through the material and you must correctly answer these to progress. If you get them wrong you are usually given hints. You will be graded on the basis of completion of a unit or part of a unit, but not on answering the questions correctly on the first try.

One week before each test we will post on Canvas some traditional style review notes and sample questions for the test. You should study these carefully. It is likely you will see this material and many of these questions on the exam. You will also receive a few email reminders before each test.

Grading

- Completing the online units: 15%
- Completion of the Astronomy Survey (Pre and Post) : 1%
- Participating in discussion board (Unit 4): 2%
- Essay (upon completion of Unit 5): 2%

- Unit exams:
 - Your highest-scoring exam of the first 4: 20%
 - Your second highest-scoring exam of the first 4: 20%
 - Your third highest-scoring exam of the first 4: 20%
 - Final Exam: 20%

NOTE: There will be no extra credit offered.

Academic Integrity

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Accommodating Disabilities

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The [Student Disability Resources \(SDR\) website](#) provides contact information for every Penn State campus . For further information, please visit [Student Disability Resources website](#).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: [See documentation guidelines](#) . If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and

discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Counseling and Psychological Services

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- [Counseling and Psychological Services at University Park \(CAPS\)](#): 814-863-0395
- [Counseling and Psychological Services at Commonwealth Campuses](#)
- Penn State Crisis Line (Available 24 hrs, 7 days a week): 877-229-6400
- Crisis Text Line (Available 24 hrs, 7 days a week): Text LIONS to 741741

Educational Equity / Report Bias

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the [Report Bias website](#).