



**Course Name:** Galaxies, Quasars and Cosmology  
**Course Number:** PH 207  
**Term Offered:** Spring 2020  
**Credits:** 4  
**Instructor name:** Dr. Kathryn Hadley  
**Instructor email:** [Kathryn.Hadley@oregonstate.edu](mailto:Kathryn.Hadley@oregonstate.edu)  
**Instructor phone:** 541-737-4312  
**Link to instructor website:** [khadley.com](http://khadley.com)

### Course Description

This course covers three main topics: galaxies and their evolution; cosmology including the big bang, evolution and large-scale structure of the universe; and fundamentals of life including the prospect of finding life beyond planet Earth. Background information, such as fundamentals of motion, electromagnetic radiation and spectroscopy are included as they pertain to dynamical behavior and observation. The courses in the astronomy sequence (PH 205, PH 206, PH 207) can be taken in any order.. (Bacc Core Course)

### Prerequisites/Corequisites

There are no prerequisites or corequisites. However, students should have a working knowledge of basic algebra and scientific notation.

### Communication

Please post all course-related questions in the General Discussion Forum so that the whole class may benefit from our conversation. Please email the instructor for matters of a personal nature. I will reply to course-related questions and email within 24-48 hours. I will strive to return your assignments and grades for course activities to you within seven days of the due date.

### Course Credits

This course combines ~120 hours of instruction, online activities, and assignments for 4 credits.

### Learning Resources

Textbook: Astronomy Today (9<sup>th</sup> Ed) by Eric Chaisson and Steve McMillan, Pearson ISBN 0321901673 (8<sup>th</sup> Ed of Astronomy Today works almost as well)

**Note to prospective students:** Please check with the OSU Bookstore for up-to-date information for the term you enroll (<http://osubeaverstore.com/Academics> or 800-595-0357). If you purchase course materials from other sources, be very careful to obtain the correct ISBN.

### Canvas

This course will be delivered via Canvas where you will interact with your classmates and with your instructor. Within the course Canvas site, you will access the learning materials, such as the syllabus, class discussions, homework assignments and labs. To preview how an online course works, visit the [Ecampus Course Demo](#). For technical assistance, please visit [Ecampus Technical Help](#).

This course is offered through Oregon State University Extended Campus. For more information, contact:  
Web: [ecampus.oregonstate.edu](http://ecampus.oregonstate.edu)      Email: [ecampus@oregonstate.edu](mailto:ecampus@oregonstate.edu)      Tel: 800-667-1465

### **Baccalaureate Core Learning Outcomes**

This course fulfills the Baccalaureate Core requirement for the Physical Sciences category. It does this by exploring concepts and theories of the origin and evolution of galaxies, the universe as a whole, and life in the universe; and applying scientific methodology to the investigation of these topics. The three Baccalaureate learning outcomes are:

1. Recognize and apply concepts and theories of basic physical or biological sciences.
2. Apply scientific methodology and demonstrate the ability to draw conclusions based on observation, analysis, and synthesis.
3. Demonstrate connections with other subject areas.

### **Course Specific Learning Outcomes**

PH 207 aligns with or meets the Baccalaureate learning outcomes in the following ways:

#### **1. Recognize and apply concepts and theories of basic physical or biological sciences.**

PH 207 focuses on the development of understanding of the interwoven nature of physical phenomena, and extrapolating what is observed to the bigger picture, in the context of galaxies, the universe as a whole, and life in the universe. For example, you will consider how a simple observation like recognizing that the more distant a galaxy is, the faster it is moving away from us implies that the universe is expanding.

**Associated activities:** Weekly homework assignments are based on the required textbook readings, tutorials and course web pages. Topical discussions requiring online posts allow you to choose a topic of interest within a small discussion group, flesh out a short report over the course of two weeks, and interact with others of your group. You will interact with classmates in other groups the following week. Discussions include topics such as dark matter, dark energy and the search for extraterrestrial life.

**Assessment:** Student achievement of this outcome is measured through evaluation of homework submissions, lab reports, discussion posts and exam responses.

#### **2. Apply scientific methodology and demonstrate the ability to draw conclusions based on observation, analysis, and synthesis.**

You will make firsthand observations of physical phenomena, observe images from telescopes, and engage with virtual experiments via state-of-the-art interactive software. In lab exercises, you will graph and analyze data of real astrophysical systems as well as virtual simulations, and analyze the motions of stars and planets in the night sky from their firsthand observations.

**Associated activities:** In PH 207, you are required to perform laboratory experiments of four main types: (i) Data analysis: for example, produce graphs of mass vs. distance for stars and exoplanets. (ii) Virtual experiments: for example, manipulate properties of light waves through a double-slit experiment (PhET). (iii) Citizen-science labs: for example, classify galaxies or identify possible merger signals in gravity wave images (Zooniverse). (iv) Night Sky Journal: catalog weekly observations of the night sky. If directly viewing the night sky is a problem, virtual observations may be substituted.

**Assessment:** Lab reports are graded for completeness, thoroughness and quality of analysis, and the student's ability to draw conclusions regarding the fundamental nature of the system.

#### **3. Demonstrate connections with other subject areas.**

PH 207 focuses on astronomy as an application of general physics. Students learn basic physics principles such as Newton's laws and Kepler's laws, including mathematical applications. PH 207 has ties to biological science in that part of the course focuses on life in the universe, including such topics as the definition of life, the origin of life, the principle of mediocrity and the search for extraterrestrial life.

**Associated activities:** Textbook readings, tutorials and web pages are devoted to the topic of life in the universe and are accompanied by homework activities and a lab exercise. You can choose to research topics such as special relativity, perception of light and various aspects of life in the universe in the weekly topical discussions.

**Assessment:** Homework exercises are graded for content, including open-ended questions regarding topics such as why it is hard to determine just what life is. Exam questions can also evaluate a student's understanding of fundamental biology associated with early life and experiments searching for the fundamental nature of the origin of life.

### **Evaluation of Student Performance**

Your course grade is determined the distribution of points is as follows:

Midterm Exam 1: 15%  
Midterm Exam 2: 15%  
Final Exam: 30%  
Homework: 10%  
Discussion: 10%  
Lab: 20%

At the end of the term, the lower cutoff for an A– will be set no higher than 90%, that for a B– will be set no higher than 80%, that for a C– will be set no higher than 70%, and that for a D– will be set no higher than 60%. The cutoff may go lower than this.

In order to pass the **course**, you must (1) take all three exams, (2) score a 50% or better on the homework component, (3) submit contribution for two discussion topics, (4) obtain the lower cutoff for a D- and (5) successfully pass at least seven labs. (70 percent is a passing lab score).

### **Technical Assistance**

If you experience errors or problems while in your online course, contact 24-7 Canvas Support via chat, phone, or e-mail through the Help link within Canvas. If you experience computer difficulties, need help downloading a browser or plug-in, or assistance logging into the course, contact the OSU Help Desk for assistance. You can call (541) 737-3474, email [osuhelpdesk@oregonstate.edu](mailto:osuhelpdesk@oregonstate.edu) or visit the [OSU Computer Helpdesk](#) online.

### **Statement Regarding Students with Disabilities**

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**Reach Out for Success:** University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at [oregonstate.edu/ReachOut](http://oregonstate.edu/ReachOut). If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

## **OSU Student Evaluation of Teaching**

Course evaluation results are extremely important and are used to help me improve this course and the learning experience of future students. Results from the questions are tabulated anonymously and go directly to instructors and department heads. Student comments on the open-ended questions are compiled and confidentially forwarded to each instructor, per OSU procedures. The online Student Evaluation of Teaching form will be available toward the end of each term, and you will be sent instructions via ONID by the Office of Academic Programs, Assessment, and Accreditation. You will log in to “Student Online Services” to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.

## **Course Policies**

### **Discussion Participation**

While there is great flexibility in online courses, this is not a self-paced course. You will need to participate in online discussions, with your first post due no later than Wednesday evening, your second by Friday and third post due by Sunday of each week. First week discussion posts are due by Sunday.

### **Proctored Exams**

This course requires that you take exams under the supervision of an approved proctor. Proctoring guidelines and registration for proctored exams are available online through the Ecampus [testing and proctoring website](#). It is important to submit your proctoring request as early as possible to avoid delays.

### **Makeup Exams**

Makeup exams will be given only for missed exams excused in advance by the instructor. Excused absences will not be given for airline reservations, routine illness (colds, flu, stomach aches), or other common ailments. Excused absences will generally not be given after the absence has occurred, except under very unusual circumstances.

### **Incompletes**

Incomplete (I) grades will be granted only in emergency cases (usually only for a death in the family, major illness or injury, or birth of your child), and if the student has turned in 80% of the points possible and has a passing percentage on the work that has been turned in. If you are having any difficulty that might prevent you completing the coursework, please don't wait until the end of the term; let me know right away.

### **Lateness Policy**

Homework exercises and labs will be accepted after the due dates, with a 20% deduction for each week late. Discussion posts will receive a 10% deduction for each day late, and will not be accepted after the end of the week (Sunday).

### **Guidelines for a Productive and Effective Online Classroom**

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility.

Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to

be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Read your posts carefully before submitting them.
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

### **Accessibility of Course Materials**

All materials used in this course are accessible. If you require accommodations please contact [Disability Access Services \(DAS\)](#).

Additionally, Canvas, the learning management system through which this course is offered, provides a [vendor statement](#) certifying how the platform is accessible to students with disabilities.

### **Expectations for Student Conduct**

Student conduct is governed by the university's policies, as explained in the Student Conduct Code <http://studentlife.oregonstate.edu/code>.

### **Academic Integrity**

Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit [Student Conduct and Community Standards](#), or contact the office of Student Conduct and Mediation at 541-737-3656.

#### *OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:*

- a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.
- b) It includes:
  - i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
  - ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
  - iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).
  - iv) TAMPERING - altering or interfering with evaluation instruments or documents.

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- v) **PLAGIARISM** - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.
- c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

### **Conduct in this Online Classroom**

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the [university's regulations regarding civility](#).

### **Tutoring**

[NetTutor](#) is a leading provider of online tutoring and learner support services fully staffed by experienced, trained and monitored tutors. Students connect to live tutors from any computer that has Internet access. NetTutor provides a virtual whiteboard that allows tutors and students to work on problems in a real time environment. They also have an online writing lab where tutors critique and return essays within 24 to 48 hours. Access NetTutor from within your Canvas class by clicking on the NetTutor button in your course menu.

## Course Content

Homework, labs and discussions are due 11:55 PT pm on the weekday indicated

Week	Topic	Reading Assignments	Learning Activities	Due Dates
1	Introduction Cosmic Perspective	Chapter 1 sec 1.1,1.2,1.3,1.6 Chapter 2 sec 2.5,2.6,2.7,2.8	Activity 1 Discussion Hw 0	Sun Sun Sun
2	EM radiation	Chapter 3	Hw 1 Discussion Lab 1	M W,F,Sun Sun
3	Spectroscopy	Chapter 4	Hw 2 Discussion Lab 2	M W,F,Sun Sun
4	Milky Way	Chapter 22.5 - 22.8 Chapter 23	Hw 3 Discussion Lab 3	M W,F,Sun Sun
5	Galaxies	Chapter 24	Hw 4 Discussion Lab 4	M W,F,Sun Sun
6	Galaxies and dark matter	Chapter 25	Midterm 1 (Thru ch 24) Hw 5 Discussion Lab 5	Proctored M W,F,Sun Sun
7	Cosmology	Chapter 26	Hw 6 Discussion Lab 6	M W,F,Sun Sun
8	Early universe	Chapter 27	Hw 7 Discussion Lab 7	M W,F,Sun Sun
9	Exoplanets	Chapter 28	Midterm 2 (Ch 25-27) Hw 8 Discussion Lab 8	Proctored M W,F,Sun Sun
10	Life in the universe	Chapter 28	Hw 9 Discussion	M W,F,Sun
Finals			Final Exam (cumulative)	Proctored

Schedule dates are tentative and may be subject to change.