



Physics 0834
Exploring the Cosmos
Course Syllabus – Spring 2015

Instructor: Dr. Matthew Newby
 Office: SERC 478
 Office Hours: M 2:30-5:30pm; T 10:00am-noon; W,F 2:00-3:00pm
 Course Coordinator: Elena Borovitskaya
 Course Questions/Support: 0834sp15@temple.edu
 Course Support Hub: <https://phys.cst.temple.edu/physics-help.html>

	Room	Day(s)	Time	Section	Instructor
Lectures	SERC 0110B	M W	1:00 – 1:50	All	Newby, Matthew
Breakouts	BartonB 200	F	1:00 – 1:50	1	Newby, Matthew
	BartonB 400	F	1:00 – 1:50	2	TBD
	BartonB 409	F	1:00 – 1:50	3	TBD
Homework	Online				Smartwork

Course Description

This course will introduce students to the basics of astronomy, and the current understand of the extra-solar Universe. Topic covered include: The history of astronomy; how astronomy defines human time-keeping; the basics of observing from Earth, including the use of light and telescopes; evolution of stars and galaxies; basic cosmology; and a brief overview of the search for extraterrestrial life. Through the study of these topics, students will exercise critical thinking skills, learn how to discern the validity and relative quality of references, understand the strengths and weaknesses of the scientific method, and learn to think like scientists.

Text and Materials

Text: *21st Century Astronomy: Stars and Galaxies*, 4th Edition, with Norton Smartwork code ISBN: 978-0-393-92057-4

Note that there are multiple ways to buy this book, including an ebook option; see the W.W. Norton website (<http://books.wwnorton.com/books/>) for more details.

Smartwork Online Homework: We will be using the SmartWork online homework system (<http://smartwork.wwnorton.com/>). Please follow the “first-time user” instructions at that link. The enrollment key for this course is “ASTRO4E7562”, without the quotes, and is case-sensitive. You will need to provide the access code that came with your textbook, or you will be automatically enrolled in a 2-week free trial. For technical support and other information, please visit <http://www.wwnorton.com/smartwork>.

Clicker: An “LCD RF” clicker can be purchased through the campus bookstore or online from Turning Technologies or a trustworthy third-party vendor. Other clicker versions should work as well. You will need to follow the instructions online at <https://computerservices.temple.edu/clickers-students> to register your clicker.

Course Support

This course is part of a pilot program of the Physics Department to centralize teaching support. You are welcome to ask questions during any class period or during instructors' respective office hours, but if you wish to ask a question via email, have a question about your grades, or have another concern, please send email to the correct link found here: <https://phys.cst.temple.edu/physics-help.html>

Course Structure

The course will meet for 1 hour three times a week (MWF). Monday and Wednesday classes will be standard lectures, with occasional clicker quizzes to stimulate discussion. Friday meetings will be either interactive lectures, breakout sessions, or exams (see below).

Friday Sessions

Interactive Lectures: Many Friday sessions will take the form of highly-interactive lectures with heavy discussion elements. These classes will meet in the normal classroom – not the breakout rooms. You will need your clicker during these lectures in order to get full credit! Typical interactive lectures will consist of discussion questions, demonstrations, and simple projects. The Interactive lecture topics are:

- #1 (Jan 16): Astronomy of the ancients
- #2 (Jan 30): “And yet it moves” - our view from Earth
- #3 (Feb 06): Gravity – it’s the (physical) Law
- #4 (Feb 13): Light – our key to the Universe
- #5 (Mar 13): Our star, the Sun

- #6 (Mar 27): Classifying stars
- #7 (Apr 03): Looking at Galaxies
- #8 (Apr 24): Are we alone? The Drake Equation.

Breakout Sessions: There are 4 breakout sessions scheduled for this semester that will meet in the designated breakout rooms (See the room assignments for your section at the beginning of the Syllabus). These sessions will be small-group hands-on activities that will give you a better handle on certain ideas. The breakout sessions are as follows:

Breakout 1 (Jan 23): **Earth as a Clock.** You will use a schematic of the Sun-Earth-Moon system to see how time and astronomy are directly related – and some of the strange things that result from this relationship.

Breakout 2 (Feb 20): **Telescope Construction.** You will construct your own telescope, learning the important components and their purposes in the process.

Breakout 3 (Mar 20): **Library Research.** You will learn how to conduct detailed research using Temple University’s Library and online catalogs. As part of this, you will learn how to tell peer-reviewed scientific papers from press releases and personal opinions.

Breakout 4 (Apr 17): **Pulsars, Redshifts.** You will build a small model pulsar, and see how viewing it from different angles results in different measurements. You will also explore how the redshifts of distant galaxies give us information about the “big picture” of the universe.

Exams: The two midterms exams will be held on Fridays; see below for more information.

Assessment Tools

Participation:	5%
Friday Classes:	10%
Homework:	10%
Observing visit:	10%
Popular Essay:	6%
Research Essay:	9%
Midterms (2):	10% each
Final Exam:	20%

Participation: While attendance is not strictly required, you will be expected to participate in clicker discussions held during Monday and Wednesday class periods. This component will count for 5% of your final grade, and you will receive full credit if you participate in at least 75% of the clicker discussions, with proportionally less credit for participation of less than 75%.

Friday Classes: Participation in the Friday breakouts and interactive lectures is an important part of the learning experience in this course, and so these sessions are weighted more heavily than the Monday and Friday lecture discussions. There are 12 Friday sections (not including the exams). These

can only be made up or waived with a valid (academic, athletic, medical, or legal), documented excuse.

Homework: Each week you will be expected to complete an online homework assignment via SmartWork. There will be 12 assignments in total, and the lowest 2 will be dropped.

Observing visit: Observing through actual telescopes is a great way to see astronomy in action. To this end, 10% of your grade in this course is based on a visit to one of the “Night Skies in the Joel N. Bloom Observatory” program at the Franklin Institute (<https://www.fi.edu/special-events/night-skies-joel-n-bloom-observatory>). Please use their website as a guide, but a \$5 admission fee gets you access to, from 6pm-9pm, a planetarium show, a lecture, and observing on the deck. There are three opportunities to catch this program during this Spring semester: Feb 12, Mar 12, and Apr 09. In order to receive credit for your visit, you will be required to submit a ticket stub along with a 1-2 page hand-written essay describing your visit by **April 17**.

Popular Essay: For this 1-3 page essay, you will take a work of fiction, such as a book or movie, and discuss the astronomy featured in that work. The goal is NOT to tear this work apart, but to give it a fair review and show that you understand the real astronomy related to the topics that are featured. This essay accounts for 6% of your final grade, and will be submitted via the “safeassign” system on Blackboard, and is due **March 20**.

Research Essay: For this 1-2 page essay, you will write an “encyclopedia entry” for a productive astronomer, such as Herschel, Galileo, Annie Jump Cannon, Oort, Edwin Hubble, Spitzer, Vera Rubin, or many others. The choice is yours but should be cleared with the instructor. (Keep in mind that Albert Einstein and Steven Hawking are NOT astronomers, they are theoretical physicists). For your chosen astronomer, your essay should contain three parts: 1) a brief **biography** of the astronomer; 2) A discussion of what his astronomer did to **impact** astronomy; and 3) a discussion of a **controversy**, whether scientific, religious, social, or other, that this astronomer involved in. You will need to cite at least 5 references for this assignment, at least one of which must be a book, and at least one other must be a written work by this astronomer, and another which must be a published scientific paper. These requirements will be discussed in the 3rd breakout session. The essay will be submitted online via the “safeassign” system on Blackboard, and is due **April 17**.

Midterms (2) and Final Exam: 10% each midterm, held on February 27 and April 10, respectively. The Final Exam will constitute 20% of your grade, and will be held on May 06, from 10:30am to 12:30pm. Midterms may only be made up if you contact the Instructor *at least* 1 week in advance with a documented and valid academic, athletic, career, medical, or legal excuse. The Final Exam may not be made up or rescheduled in any way.

Grading

Your final grade in the course will be determined by the quality of your assignments, weighted as indicated above. Your percentage of earned points will result in a final letter grade as follows:

92+	▶	A
89 to 91.9	▶	A-
87 to 88.9	▶	B+
82 to 86.9	▶	B
79 to 81.9	▶	B-
77 to 78.9	▶	C+
72 to 76.9	▶	C
69 to 71.9	▶	C-
60 to 68.9	▶	D
Less than 60	▶	F

Academic Dishonesty

Students are encouraged to work together on homework and discussions, but are expected to submit their own answers. When you put your name on a submission, you are claiming that work as your own; using external sources without proper citation is then considered to be dishonest – plagiarism. Evidence of dishonest work on any assignment will result in a “zero” grade for that assignment. Dishonest work on an exam, or repeated abuses, will result in an automatic failing grade in the course.

Schedule and Dates

Week	Chapter(s)	Topics	Friday	Comments
#1: Jan 12 - 16	1	Intro, Scientific Method, History	Interactive Lecture #1	
#2: Jan 19 - 23	2	Patterns in the Sky	Earth Clock	No Class Monday
#3: Jan 26 - 30	2-3	Motions	Interactive Lecture #2	Add/Drop deadline
#4: Feb 2 - 6	3-4	Motions and Gravity	Interactive Lecture #3	
#5: Feb 9 - 13	5	Light	Interactive Lecture #4	
#6: Feb 16 - 20	6	Telescopes	Telescope Construction	
#7: Feb 23 - 27	13	Measuring Stars	<i>Exam 1</i>	
#8: Mar 2 - 6		Spring Break		
#9: Mar 9 - 13	14-15	The Sun and Star Formation	Interactive Lecture #5	
#10: Mar 16 - 20	15,16,17	Stellar Evolution	Library Research	Popular Essay Due (Friday)
#11: Mar 23 - 27	17,18	Relativity & Black Holes	Interactive Lecture #6	
#12: Mar 30 – Apr 3	19	Expanding Universe	Interactive Lecture #7	
#13: Apr 6 - 10	20, 21	Galaxies	<i>Exam 2</i>	
#14: Apr 13 - 17	22, 23	Cosmology	Pulsars and Redshifts	Research Essay Due (Friday)
#15: Apr 20 - 24	24	Life	Interactive Lecture #8	
#16: Apr 27		Review		Mon: Classes end

Important Dates:

Smartwork Homework, due weekly on Sundays at 11:59pm.

Observing Report due April 17

Popular Essay due March 20

Research Essay due April 17

Midterm Exam 1: Feb 27

Midterm Exam 2: Apr 10

Final Exam: May 06