

# PHY 105: “Structure of the Universe”

Fall 2017

Tu/Th 12:30 p.m. – 1:45 p.m. Merion 112

**Course description:** Our ultimate goal in PHY 105 is to develop insight into how the science of physics can be applied to the study of planets, stars, galaxies, and the universe as a whole. We will begin our studies by examining our place in the universe and how the motions of stars and other celestial bodies appear to us as observers on Earth. From there, we will study the modern physical theories of motion, light, and matter that help us make sense of the universe we live in.

**Instructor: Dr. Robert Thornton**

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Office hrs: Tu 1:45-3:30 p.m.; Wed 1:00-2:30 p.m.; Th 1:45-3:30 p.m.; also by appt.

**Course Requirements:** This course has no prerequisites. However, we will be using some basic algebra at the high school math level. If it's been a few years, you may need to brush up on it. I will be happy to help you if you put forth the effort.

## Required Course Materials

- *The Essential Cosmic Perspective*, 7<sup>th</sup> ed., Bennett et al.
- a scientific calculator that is not part of any device with wireless capability.
- QT2 clickers (available from bookstore)



**Course Web page: Syllabus and related material will be on D2L**

## Grading:

Exam 1, Exam 2, Exam 3 (50% total)

Homework: 15%

Cumulative final exam: 20%

Attendance/Class participation: 15%

**Total: 100%**



**Attendance and Class participation:** Both are important parts of the class, and will be recorded using the Turning Technologies QT2 clicker system (picture shown above), which is the standard clicker adopted by WCU. Therefore, you need to have one of these devices (NOT the cell phone app!), as well as a Turning Account license to receive credit. You can buy the clicker and a license from either the SSI bookstore or Turning Technologies. There is a registration webpage on the D2L course page. Help with completing the full clicker registration can be found at [the Digital Corner](http://turningtechnologies.com/); clicker support can be found at <http://turningtechnologies.com/>, and/or by emailing [support@turningtechnologies.com](mailto:support@turningtechnologies.com). I will start posting clicker “results” starting with the first class so that you can check if you using your device properly (including the license). However, to give people time to settle in, no answers will count toward your grade until the third week of class. Given that attendance/participation comprises 15% of your final grade, make sure that you bring the clicker to every class, and that you check its battery life periodically. How does the clicker response contribute to your grade? I will pose several multiple choice questions to you each lecture period. Half of the 15% goes toward simply showing up and clicking ANY answer to the questions that are posed to the class. The other half of the 15% is reserved for getting the CORRECT answer. I do understand that on occasion something unforeseen will pop up and prevent you from attending class; therefore, at the end of the term I will drop three (3) days of class participation points. If you miss class due to an excused absence (see definition of

an excused absence below), it is your responsibility to meet with me to give you credit for participation points on the day you missed.

In order to earn class participation points with your clicker, YOU must be the one entering responses with it. I have a zero tolerance policy for anyone who hands their clicker to a classmate and tells that classmate to use it in class for them. I will periodically do a head count in class and compare it to the number of responses for that class period. If I catch anyone using multiple clickers in a class, this will be construed as cheating, and result in all involved parties receiving an F for the semester.

Excused absences are limited to those due to participation in University-sanctioned events (see policy in the WCU undergraduate catalog) or those accompanied by written confirmation from a doctor, the Dean of Students, etc. Whether your absence is excused or unexcused (or if you are late to class), you will be responsible for any material covered and any announcements that were made in class that day. More details are contained in the WCU Undergraduate Catalog.

**Homework:** Throughout the semester there will be ten homework assignments, which will be posted in the “Content” section of D2L. There are two parts to each homework assignment:

1. a multiple choice section, the answers to which students should record in the Assessment → Quizzes section of D2L.
2. an “open ended” question section that is not collected, but whose questions will be similar to the types of open-ended questions on tests.

No late homework assignments will be accepted. Homework assignments and due dates are listed tentatively below, but changes may be announced in class and/or over email. If you miss class, you are responsible for finding out what homework was assigned and when it is due.

**Reading:** Students are expected to keep up with the reading in the book as (and preferably *before*) the associated material is covered in class. If you take the time to do this, things will make more sense in class and your performance on homework and exams will likely improve.

### **West Chester University General Education Goals:**

This course strives to have students meet the following general education goals:

1. Ability to communicate effectively
2. Ability to employ quantitative concepts and mathematical methods
3. Ability to think critically and analytically

### **Mid-Semester exam dates and policy:**

There will be three tests over the course of the semester. An unexcused absence on the day of a test will result of a grade of zero for that test. Excused absences are limited to those due to participation in University – sanctioned events (see policy in the WCU undergraduate catalog) or those accompanied by written confirmation from a doctor, the Dean of Students, etc. If you are sick, you MUST obtain a doctor’s note BEFORE the day of the test. I do not give make up tests. You are encouraged to bring a calculator to the exams, but the calculator cannot be a part of a cell phone, iPod, etc. (i.e., it must be ONLY a calculator).

### **Final Exam (Cumulative):**

The final exam is mandatory. Missing the final exam will result in a zero for the exam unless EXTREME circumstances apply. Even in that case, extra questions will be added to the make-up final.

**Public Safety:** All students are encouraged to sign up for the University’s free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information and to sign

up, visit [www.wcupa.edu/wcualert](http://www.wcupa.edu/wcualert). To report an emergency, call the Department of Public Safety at 610-436-3311.

### Course Schedule (Tentative!!)

Class	Date	Chapter	Topic	HW
1	Aug 29	1	Intro, Scales, and Units	HW1 OUT
2	Aug 31	1 & 2	Units & Motions in the sky	
3	Sep 5	2	Motions and angles in the sky	HW1 DUE; HW2 OUT
4	Sep 7	2	Seasons & Moon	
5	Sep 12	3	History and Kepler's Laws	HW2 DUE; HW3 OUT
6	Sep 14	4	Newton's Laws of Motion & Gravity	
7	Sep 19	4	Gravity	HW3 DUE; HW4 OUT
8	Sep 21		<b>TEST #1 (Ch 1 - 3)</b>	
9	Sep 26	5	Electromagnetic Spectrum	HW4 DUE; HW5 OUT
10	Sep 28	5	Color & temperature	
11	Oct 3	5	Spectra & Doppler shift	
12	Oct 5	5 & 6	Telescopes, SS Intro (ang mom)	HW5 DUE; HW6 OUT
	Oct 10		<b>FALL BREAK</b>	
13	Oct 12	10	Exoplanets	
14	Oct 17	11	The Sun	HW6 DUE
15	Oct 19	11	The Sun	
16	Oct 24		<b>TEST #2 (Ch 4 -6)</b>	
17	Oct 26	12	Properties of Stars	HW7 OUT
18	Oct 31	12	Properties of Stars	
19	Nov 2	12 & 13	Star Clusters & Stellar Evolution	HW7 DUE; HW8 OUT
20	Nov 7	14	SN, NS, WD	
21	Nov 9		Black holes & relativity	HW8 DUE
22	Nov 14	15	The Milky Way	HW9 OUT
23	Nov 16		<b>TEST #3 (Ch 6-10)</b>	
24	Nov 21	16	Galaxies & Distance Ladder	
25	Nov 23		THANKSGIVING	HW9 DUE
	Nov 28	17	Distance Ladder	
26	Nov 30	17	Big Bang	HW10 OUT
27	Dec 5	18	Dark Energy & Dark Matter	
28	Dec 7		Course review	HW10 DUE on Fri. Dec 8
xx	Dec 14		<b>FINAL EXAM (MER 112) 10:30 a.m. – 12:30 p.m.</b>	All done!

### Intellectual Property Statement:

The instructor for this course utilizes copyrighted materials under the "Freedom and Innovation Revitalizing United States Entrepreneurship Act of 2007" (Fair Use Act). Apart from such copyrighted materials, all other intellectual property associated with this course is owned and copyright protected by the instructor, including, but not limited to, lectures, course discussions, course notes and supplementary materials posted or provided to students authored by the instructor, assessment instruments such as quizzes and exams, and Power Point presentations. No recording, copying, storage in a retrieval system, or dissemination in any form, whether electronic or other format, by any means of the intellectual property of the instructor, either in whole or in part, is permitted without the prior written permission of the instructor. When such permission is granted, it must specify the utilization of the intellectual property and all such permissions and waivers shall terminate on the last day of finals in the semester in which this course is held.

Links and references to on-line resources provided by the instructor may lead to other sites. The instructor does not sponsor, endorse or otherwise approve of any information appearing in those sites, nor is responsible for the availability of, or the content located on or through, external sites. Apart from materials used in accordance

with the Fair Use Act, the instructor takes no responsibility for material that is otherwise offered at web sites and makes no warranty that such material does not infringe any third party rights. However, should any of this type of material be present and this fact is brought to the attention of the instructor, they will remove references to it from course materials.

**Students with Disabilities:** If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's [Services for Students with Disabilities](#) (OSSD), please contact the OSSD which is located at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday 8:30 a.m. – 4:00 p.m. Their phone number is 610-436-2564, their fax number is 610-436-2600, and their email address is [ossd@wcupa.edu](mailto:ossd@wcupa.edu). See the following website for more information: <http://www.wcupa.edu/ussss/ossd/default.aspx>.

**Email Policy:** It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

**Tutoring:** Tutoring for many 100 level courses is offered by the [Learning Assistance Resource Center](#) (LARC), 224 Lawrence Center, phone number 610-436-2535. As of the current moment, PHY 105 is not one of those courses; however, the people at LARC will work with you to try and find a tutor if you need one. See the following website for more information: <http://www.wcupa.edu/ussss/larc/>. LARC tutoring is free of charge, but you must sign up at the beginning of the semester. Physics majors MAY offer tutoring in PHY 105 during the semester. An announcement will be made in class if this is the case.

**Academic & Personal Integrity:** It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the *Ram's Eye View*, and the University website at [www.wcupa.edu](http://www.wcupa.edu).

**Reporting Incidents of Sexual Violence:** West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator, Ms. Lynn Klingensmith. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at the webpage for the Office of Social Equity at <http://www.wcupa.edu/admin/social.equity/>.