

# Physics 390: Fundamentals of Astrophysics

West Chester University  
Spring 2021

## Syllabus

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### Instructor

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### Office hours

Day	Time
Tuesday	11:00 am–12:00 pm ET
Thursday	11:00 am–12:00 pm ET
Friday	10:00 am–12:00 pm ET

### Course details

The format for this course is *remote-synchronous*. Class activities will be conducted synchronously via [Zoom](#) during the official course meeting times: **Tuesday & Thursday, 9:30-10:45 am ET**.

### Course description

*PHY390: Fundamentals of Astrophysics* is an introductory course in astrophysics. Topics include celestial mechanics, the Earth-Moon system, the interaction of light and matter, stellar properties, stellar atmospheres, stellar structure, the life cycle of main-sequence stars, stellar remnants, close binary systems, exoplanets, and cosmology.

**Pre-requisite:** Satisfactory completion of *PHY 240: Modern Physics*.

### Time commitment

PHY390 is a 3-credit hour course presented at the junior/senior level. As such, this course requires about 6 hours of reading, assignments, and studying outside of scheduled class time each week.

### Student learning outcomes

This course contributes to the following Physics Department student learning outcomes:

- *Knowledge and understanding of the concepts and principles of physics (Outcome A).* Upon successful completion of this course, students will demonstrate competence solving problems involving the topics listed in the [Course description](#).

Course material is introduced through lecture and textbook reading. Weekly homework assignments provide students with training and practice. Student competence is

primarily assessed through in-class exams.

- *Research skills and information literacy (Outcome B)*. Upon successful completion of this course, students will demonstrate the ability to locate and digest literature on an advanced topic in astrophysics.

In the project, students will research a topic of their choice using materials appropriate for advanced undergraduates, e.g., advanced textbooks, reviews, and journal articles.

- *Effective Communication (Outcome C)*. Upon successful completion of this course, students will (i) demonstrate the ability to formulate complete written solutions to problems in astrophysics, and (ii) provide a written summary of an advanced topic in astrophysics.

(i) Weekly homework assignments serve as both a practice and assessment tool for this outcome.

(ii) In the project, students will write a report, accessible to their peers, which summarizes an advanced topic in astrophysics. Students may seek feedback on early drafts, and will be assessed on the final product.

## Course materials

The course textbook is *An Introduction to Modern Astrophysics*, Second Edition, by Bradley W. Carroll and Dale A. Ostlie (Cambridge UP, ISBN: 9781108422161). You are expected to have access to this text. New versions of the textbook are for sale at the [WCU campus store](#); you will find less expensive options elsewhere.

## Assessment

This course follows the official WCU scale for grades:

Grade	Quality Points	Percentage	Interpretation
A	4.00	93–100	Excellent
A–	3.67	90–92	
B+	3.33	87–89	Superior
B	3.00	83–86	
B–	2.67	80–82	
C+	2.33	77–79	Average
C	2.00	73–76	
C–	1.67	70–72	
D+	1.33	67–69	Below Average
D	1.00	63–66	
D–	0.67	60–62	
F	0.00	<60	Failure

Refer to the [WCU Undergraduate Catalog](#) for description of NG (No Grade), W, Z, and other grades.

Elements of the course will contribute to the course grade as follows:

Percent	Category
30%	Homework (10 assignments, each worth 3%)
50%	Exams (2 exams, each worth 25%)
20%	Project

**30% Homework:** Weekly homework assignments are posted on [D2L](#) and are due **at 5:00 pm ET on Fridays** – see the [Course Schedule](#) for details. Homework will be submitted via [Crowdmark](#).

Homework should be prepared following the [Homework guidelines](#) below. Homework is assessed for both completeness and accuracy. Homework may be “spot checked”, i.e., not all aspects of an assignment may be examined. Solutions to homework problems are posted on [D2L](#) after the assignment deadline.

**50% Exams:** There will be 2 exams offered during the semester; each exam is worth 25% of your course grade. Exams will be offered during the following weeks:

- **Exam 1: week of 7 March**
- **Exam 2: week of 25 April**

You should plan to be available for exams during these weeks. Exams may be offered as timed, synchronous activities during official course meeting time, or they may be offered as timed, asynchronous activities (i.e., “take home exams”). The details of each exam will depend on how the course progresses; more precise information will be given closer to the date each exam is offered. Exams are not offered at alternate times, unless an exam conflicts with an event which is recognized by the WCU [Excused Absences Policy](#)– see [Excused absences](#) below.

Exam scores may be scaled (“curved”) to conform to a standard distribution of grades. Failure to take a exam results in a 0 score.

**20% Project:** As a final activity, you will research your choice of advanced topic in astrophysics. You will write a report which summarizes your topic and which is presented at a level accessible to your peers. Further details of the project will be provided in the [project prompt](#). I am happy to provide suggested topics, resources, and feedback on drafts of reports. Projects must be submitted as a single PDF document to the submission box on [D2L](#) by the deadline of **Friday, 07 May, at 11:59 pm ET**.

Although unlikely, I reserve the right to alter the assessment scheme in order to accommodate for unforeseen circumstances or to better serve the learning objectives of the course. Due dates of assignments as well as the dates of exams may change.

## Homework guidelines

When completing homework, your goal is to formulate **complete solutions** to the problems. A complete solution to a problem is a work of prose which guides the reader through the process of understanding the problem, solving the problem, and verifying the answer. A solution is not simply “the answer”, nor is it your original scratch work. It includes all necessary figures, assumptions, explanations, mathematical steps, and checks. When writing up your homework solutions, follow these guidelines:

- **Format:** You will submit your work to [Crowdmark](#). Your solutions should be hand-written with black or blue writing on clean, white, letter-size paper. Colored pens and graph paper are okay for drawing figures. If you make a mistake, simply cross it out – no white out or scribbling. Alternatively, you may use a tablet computer. No typesetting (i.e., do not use an equation editor or LaTeX).
- **Organization:** Solutions should be labeled by problem number and should be in order.
- **Expository text:** Include sufficient prose to guide the reader (a.k.a., someone like you) through your solution.
- **Methodology:** Your strategy for solving the problem should be clear to the reader. Include pictures and diagrams. List any assumptions that are not stated in the problem. When appropriate, explain why you believe your results to be accurate.
- **Math:** Include all necessary math steps.
- **Cite references:** List any collaborators, and cite any references you use, aside from the course documents.

Following these guidelines may seem daunting at first, but you get the hang of it quickly. Not all problems require a lengthy exposition. Use your judgment.

Homework solutions posted on [D2L](#) provide examples of how to write solutions.

## Accommodation

If you require additional accommodation for any aspect of the course you must notify me in advance so that we can make arrangements. Depending on the accommodation, you may need to provide documentation.

- **OSSD:** If you have an ongoing medical condition which effects your ability to meet the course expectations then you should register with the [Office of Services for Students with Disabilities](#) (OSSD). **To receive accommodation you must submit your OSSD letter via D2L** (path: Assessments>Assignments>OSSD letters of accommodation).
- **Health/wellness conditions:** If you have a medical condition which causes you to miss at least three consecutive school days then you may seek accommodation from [Student Assistance](#).

- **Personal emergencies:** Rarely, a personal emergency can arise which prevents a student from meeting course expectations. In such a rare circumstance I am happy to work with the student in order to make appropriate arrangements. I may require documentation which verifies the emergency. [Student Assistance](#) can serve as a confidential liaison to verify the emergency.

## Excused absences

This course adheres to the WCU [Excused Absences Policy](#). If you are unable to perform an aspect of the course due to a conflict recognized by this policy (which includes University-Sanctioned Events) you must notify me in advance so that we can make arrangements. **Documentation verifying your participation in the event must be submitted via D2L** (path: Assessments>Assignments>Documentation for excused absences).

## Policies on late or missed work

If you suspect that you will not be able to meet a course deadline you should notify me in advance so that we can discuss possible resolutions. The default policies on late and missed work are as follows:

- **Other courses:** No other course has priority over this course. The obligations of your other courses do not excuse you from meeting obligations for this course.
- **Homework:** Late work may receive a reduced score, and may not be considered. No work is accepted after solutions are posted on [D2L](#).
- **Exams:** Exams are not offered at alternate times, unless an exam conflicts with an event which is recognized by the WCU [Excused Absences Policy](#)– see [Excused absences](#) above. Failure to take an exam results in a 0 score.
- **Project:** Late work may receive a reduced score, and may not be considered.

## Attendance policy

Attendance is not a graded item in this course.

If you miss a class meeting then it is your responsibility to make up the missed learning opportunity by reviewing course materials on your own. Missing class does not excuse you from completing other aspects of the course on time.

Your attendance is excused for conflicts recognized by the WCU [Excused Absences Policy](#)– see the [Excused absence](#) policy above.

## D2L, email, and all that

- **D2L:** Course materials are maintained on the course [D2L](#) site. You are responsible for regularly checking the course [D2L](#) site. I may not announce in class changes to course content on [D2L](#). As with all technology, [D2L](#) can have glitches and service outages. For this reason, check [D2L](#) frequently and do not leave tasks to the last minute.

- **Communication:** I use the [D2L](#) announcement tool to make class-wide announcements. I use email for individual correspondence and for time-sensitive class-wide communications. Except in the event of a technical failure or an emergency, I will only use university email (mine and yours) to correspond.
- **Email:** Emails should be written with appropriate language and etiquette.
- **Recording:** This course uses technology for virtual meetings. The use of such technology is governed by privacy laws, including Pennsylvania Wiretap Law and FERPA. **Students do not have permission to record virtual meetings or any other audio or visual correspondence related to this course or the instructor.** See [Accommodation](#) above and [Intellectual property](#) below.

## Academic integrity

Students are expected to follow all WCU rules and guidelines on academic integrity as described in the [WCU Undergraduate Catalog](#). Here are a few relevant issues for this class:

- **Online platform:** [D2L](#), [Zoom](#), and [Crowdmark](#) are extensions of the classroom and as such all WCU rules regarding student behavior apply on these platforms. Do not violate the copyrights of these sources. Do not misrepresent your identity on these platforms, either by impersonating someone else or by allowing another person to impersonate you.
- **Collaboration:** Students are encouraged to study together and collaborate on assignments. However, you should go through the process of solving each homework problem yourself. Please list collaborators on your homework. Submitting solutions which you have not yourself obtained is fraud.
- **Resources:** Students are welcome to use online resources to help them complete assignments. Please list any reference you use (aside from course materials) on your homework. However, “resources” does not include specific solutions to assigned problems, whether found online or elsewhere. Submitting solutions which you have not yourself obtained is fraud.

Students who violate WCU rules of academic integrity will receive an [Academic Integrity Violation Report](#), and may receive a failing grade (F) in the course.

## Intellectual property

The instructor utilizes copyrighted materials under the Freedom and Innovation Revitalizing the 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 copyrighted by the instructor, including, but not limited to, lectures, course discussions, course notes, slides, assessment instruments such as exams, and supplementary materials posted or provided to students authored by the instructor. No recording, copying, storage in a retrieval system, or dissemination in any form by any means of the intellectual property of the instructor, in whole or in part, is permitted without 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 the semester in which this course is held.

# Statements Common to All WCU Undergraduate Syllabi



## COVID-19 STATEMENT

Part of West Chester University's response to the COVID-19 pandemic was to switch the vast majority of instruction to remote. This decision was made out of an abundance of caution to protect the health of all members of the WCU community. Faculty have been asked to make every effort to adapt their courses to this novel situation while still meeting the critical learning outcomes of the course. Students are asked to discuss any problems with the new course format and schedule directly with their instructors. Patience and flexibility on everyone's behalf are critical to our community's navigation of this public health crisis.

For this particular course, the following alternative modalities are being utilized:

- Lecture activities are completed remotely through both synchronous and asynchronous activities.
- Assessment activities are completed remotely through both synchronous and asynchronous activities.
- Office hours are completed remotely through both synchronous and asynchronous communication.

## 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).

## 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 visit them at 223 Lawrence Center. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is [ossd@wcupa.edu](mailto:ossd@wcupa.edu), and their website is at <https://www.wcupa.edu/universityCollege/ossd/>. In an effort to assist students who either receive or may believe they are entitled to receive accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, the University has appointed a student advocate to be a contact for students who have questions regarding the provision of their accommodations or their right to accommodations. The advocate will assist any student who may have questions regarding these rights. The Director for Equity and Compliance/Title IX Coordinator has been designated in this role. Students who need assistance with their rights to accommodations should contact them at 610-436-2433.

## EXCUSED ABSENCES POLICY

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

## 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 comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. 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: <https://www.wcupa.edu/admin/diversityEquityInclusion/sexualMisconduct/default.aspx>

#### **EMERGENCY PREPAREDNESS**

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

#### **ELECTRONIC MAIL 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.