

 <p>POINT LOMA NAZARENE UNIVERSITY</p>	<p>Department of Physics and Engineering PSC1004: The Cosmos 4 Units Prerequisites: MTH 0099 or equivalent</p>
<p>Fall 2023</p>	

Fall 2023:	August 28 — 13 December
MWF: 8:30 – 9:25	Bond Academic Center 103
Instructor:	David Nichols
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Office hours:	Monday, 11:00 AM–12:00 PM Rohr Science 278 By appointment or on Zoom

PLNU Mission
To Teach – To Shape – To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission

The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

Foundational Explorations Mission

PLNU provides a foundational course of study in the liberal arts informed by the life, death, and resurrection of Jesus Christ. In keeping with the Wesleyan tradition, the curriculum equips students with a broad range of knowledge and skills within and across disciplines to enrich major study, lifelong learning, and vocational service as Christ-like participants in the world’s diverse societies and culture.

Course Description

An introduction to our place in the universe emphasizing religious, cultural and historic perspectives including modern developments in physics and astronomy. (Meets a Foundational Explorations requirement; does not count toward any Chemistry or Physics majors.)

Foundational Experience & Course Learning Outcomes

This course is one of the components of the Foundational Experience program at Point Loma Nazarene University, through which students will acquire knowledge of human cultures and the physical and natural world while developing skills and habits that foster life-long learning. Specifically, this course supports this broader context in developing FELO 1e. *Quantitative Reasoning: Students will be able to solve problems that are quantitative in nature.*

Within these broader goals, this course develops students skills so they will be able to:

1. apply basic scientific principles to address topics in cosmology and astronomy
2. explain observations of the cosmos in terms of scientific processes
3. apply a scientific approach to ask and address questions about our planet, galaxy, and universe
4. solve qualitative and quantitative problems relevant to introductory astronomy
5. discuss how modern science relates to human culture and the origins of cosmology

Required Texts and Materials

- *Electronic Access to: Understanding Our Universe*, 4th edition by Stacy Palen and George Blumenthal, ISBN 9780393533873
- a scientific calculator
- optional (free) resource: <https://openstax.org/details/books/astronomy>

Course Credit Hour Information: In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 4 unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. Specific details about how the class meets the credit hour requirements can be provided upon request.

Assessment and Grading: The grade you earn in this course is based on the scale below. The points you receive during the course are weighted accordingly:

(15%) In-Class Explorations: Various activities completed in class and turned in on paper at the end of the class session. They may not be submitted after class unless your absence is an officially excused one. Your three lowest scores will be dropped.

(10%) Homework problems: These problems are expected to be turned in to Canvas by the start of class on the due date. Late work will not be accepted. Your lowest score will be dropped.

(10%) Reading Assignments These are multiple choice problems done based on your reading. These will be done in Canvas and must be turned in by the due date.

(40%) Four exams: These will include both multiple-choice or short answer conceptual questions, and problems to solve. Exams will be closed book, but you may bring a sheet of notes to use during your exam. Partial credit will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for me to understand. For problems that call for a solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown. Exams are to be taken at the time indicated in the syllabus unless other arrangements are made in advance with the instructor or for some unavoidable circumstance, and otherwise cannot be made up.

(25%) Comprehensive Final exam: Posted with the final examination schedule

Final Grades will be based on the following table. Note that the lower portion of the range is inclusive, while the upper end of the range is exclusive. So, 87.5% is a B+ while 90.0% is an A-.

A	B	C	D	F
	B+ 87.5–90.0	C+ 77.5–80	D+ 67.5–70	F Less than 60
A 92.5–100	B 82.5–87.5	C 72.5–77.5	D 62.5–67.5	
A- 90.0–92.5	B- 80.0–82.5	C- 70.0–72.5	D- 60–62.5	

Final Exam Policy: Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Class Schedules site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for *one* of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

Incompletes: Incompletes will only be assigned in extremely unusual circumstances.

Artificial Intelligence (AI) Policy Use of Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) is not permitted, and use of these tools will be treated as plagiarism.

PLNU Copyright Policy: Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU Academic Honesty Policy: Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the University Catalog. See Academic Policies in the catalog for definitions of kinds of academic dishonesty and for further policy information.

PLNU Academic Accommodations Policy: PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

PLNU Attendance and Participation Policy: Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day. Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies site in the Undergraduate Academic Catalog. If absences exceed these limits but are due to university excused health issues, an exception will be granted.

Language and Belonging Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

You may report an incident(s) using the Bias Incident Reporting

Class Enrollment: It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Spiritual Care: Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the Office of Spiritual Development Office of Student Life and Formation.

Sexual Misconduct and Discrimination: Point Loma Nazarene University faculty are committed to helping create a safe learning environment for all students. If you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that help and support are available through the Title IX Office at <https://www.pointloma.edu/Title-IX>. Please be aware that under Title IX of the Education Amendments of 1972, it is required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at <https://www.pointloma.edu/title-ix>.

State Authorization: State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on State Authorization to view which states allow online (distance education) outside of California.

Topics at a glance

Date	Topic	Reading
8/28	Introductions	
8/30	Our Place in the Universe	1.1-1.3
9/1	Patterns in the Sky: Vocab and Seasons	
9/4	<i>No Class</i>	<i>Labor Day</i>
9/6	Patterns in the Sky: The Moon	2.3-2.4
9/8	Laws of Motion I	3.1-3.2
9/11	Laws of Motion II	3.3-3.4
9/13	Laws of Motion III	3.4-3.5
9/15	Light and Telescopes	4.1-4.3
9/18	Light and Telescopes & Wrap-up	4.3
9/20	Test 1:	Introduction to Astronomy
9/22	The formation of Stars and Planets I	5.1-5.3
9/25	The formation of Stars and Planets II	5.4-5.6
9/27	Inner Solar System I	6.1-6.3
9/29	Inner Solar System II	6.4-6.5
10/2	Atmospheres I	7.1-7.3
10/4	Atmospheres II	7.3-7.5
10/6	Giant Planets I	8.1-8.3
10/9	Giant Planets II	8.3-8.5
10/11	Smaller Bodies I	9.1-9.3
10/13	Smaller Bodies II	9.4-9.6
10/16	Review and Wrap Up	
10/18	Test 2	The Solar System
10/20	<i>No Class</i>	<i>Fall Break</i>
10/23	Measuring the Stars I	10.1-10.2
10/25	Measuring the Stars II	10.3-10.4
10/27	The Sun I	11.1-11.2
10/30	The Sun II	11.3-11.4
11/1	Low Mass Stars I	12.1-12.3
11/3	Low Mass Stars II	12.4-12.6
11/6	High Mass Stars I	13.1-13.3
11/8	High Mass Stars and Black Holes	13.4-13.6
11/10	Test 3	The Stars
11/13	Measuring Galaxies I	14.1-14.2
11/15	Measuring Galaxies II	14.3-14.4
11/17	Dark Matter	15.1-15.4
11/20	The Universe I	16.1-16.3
11/22	<i>No Class</i>	<i>Thanksgiving</i>
11/24	<i>No Class</i>	<i>Thanksgiving</i>
11/27	The Universe II	16.4-16.6
11/29	Structure I	17.1-17.3
12/1	Structure II	17.4-17.5
12/4	Test 4	Cosmology
12/6	Life in the Universe I	18.1-18.4
12/8	Life in the Universe II	18.1-18.4
12/13	Final Exam	7:30 - 10:00 AM