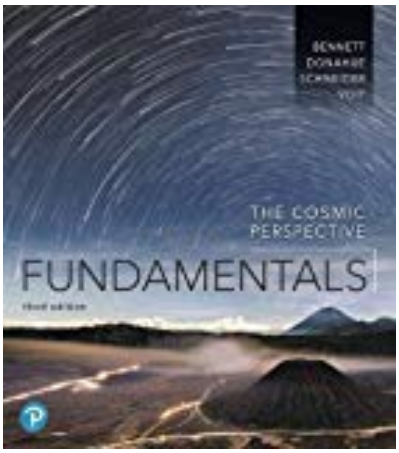
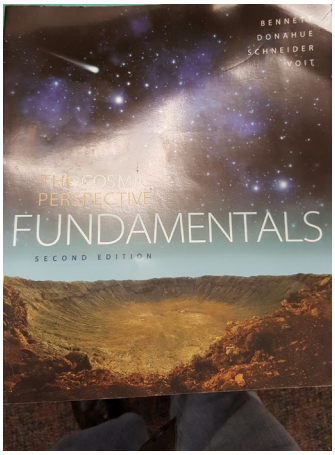
Point Loma Nazarene University
PSC 1004-01: The Cosmos (4.0 units)
Spring Semester 2020

CREDIT AND CONTACT HOURS: 4 credit hours.
Class meets 3 times per week for 3 3/4 hours per week.
Lecture Class MWF 8:25-9:40 LBRT 207

INSTRUCTOR:	Chris Gabler
CONTACT INFO:	cgabler@pointloma.edu
Office:	Rohr Science 2nd Floor Adjunct office RS-282
Office hours:	TR 12:30-1:30 pm, W 10:30 – 11:30 am or by appointment
Phone:	Cell: 858-354-8762

TEXTBOOK:
Materials - The Cosmic Perspective Fundamentals, 3e. Bennett, Donahue, Schneider, Voit (2015) San Francisco: Pearson & Co. You can use the 2nd edition as well. The textbook is aimed to help you prepare for the class and answer reading questions posted on Canvas every week.





Professor's note: 1) For a physical science class like astronomy, you will need a "Scientific Calculator" that allows you to use powers of ten to represent numbers in scientific notation, (e.g. 6.02×10^{23}), with an "EXP" or "EE" function button. These calculators can be any brand, like Casio. Most of them you can get for $6 - $7 apiece.
2) Do **not** get a business calculator, because those calculators do not feature scientific notation, and they cannot store extremely large or extremely small numbers that you can with a scientific calculator. They will not help you in astronomy.
3) The app that some people use on a smart phone is ***not*** a substitute for a scientific calculator. Please make a note to have a scientific calculator.

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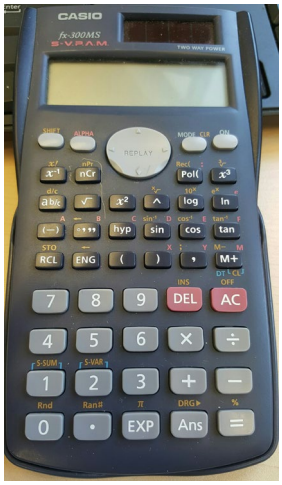

Casio Scientific Calculator

CANVAS and COURSEWORK:

The online resource Canvas is integral for this course, and you are expected to login regularly. You need a reliable internet connection to be able to use this resource.

Online resources:

If your textbook is late use http: //www.astronomynotes.com/ to get ready for the class. Chapter 1 (Astronomy as a Science and a Sense of Scale) and Chapter 3 (Astronomy without a Telescope) will be covered in the first two weeks of class.

University of Nebraska-Lincoln also has free astronomy resources.
ClassAction, NAAP Labs, Interactives and Videos
http://www.astro.unl.edu/classaction/
Astronomy Picture of the Day: This online reference is worth looking at regularly.
http://www.apod.nasa.gov

UNIVERSITY MISSION:

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.

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COURSE DESCRIPTION

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 cultures.

An introduction to our place in the universe emphasizing religious, cultural and historic perspectives including modern developments in physics and astronomy. (Meets a general education requirement; does not count toward any Chemistry or Physics majors.)
Prerequisite(s): MTH 099 or equivalent.

GENERAL EDUCATION INFORMATION

This course is one of the components of the General Education Program at Point Loma Nazarene University, in support of the general education learning outcome: *Quantitative Reasoning: Students will be able to solve problems that are quantitative in nature*. The purpose of general education is to provide a common educational experience, to develop essential skills, and to provide a broad cultural background for personal and professional growth. PSC 1004 – The Cosmos is an introductory course appropriate for students with an adequate background in high school mathematics.

COURSE LEARNING OUTCOMES

– An emphasis is placed on both conceptual understanding and the ability to solve problems dealing with the concepts studied. As part of the General Education at Point Loma this course places a particular emphasis on quantitative reasoning, particularly through the lens of the physical sciences. The main objective of this course is to fulfill the physical science requirement of a general college education while using the discipline of astronomy as a tool. That is, this course aims to teach you how to think critically and scientifically, and to give you a cosmic perspective of our universe.

COURSE LEARNING OUTCOMES

Specifically, you be able to:

1. Developing basic scientific literacy and insight into the integrated scientific description of our whole cosmos.

2. Understanding how modern science relates to human culture and the origins of modern cosmology.

3. Observe the science of the physical universe as a dynamic changing system, and which of these processes are evolutionary processes.

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4. The integration of modern science and personal faith.

General Education Learning Outcomes: GELO 1e will be assessed directly using problems on the final exam that are quantitative in nature.

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.

Class Meetings – Learning astronomy requires active learning and participation during class. In preparation for each class meeting there is a reading assignment. To maximize your learning and participation during our meetings it is very important that you have read this material before class.

Credit Hour: In the interest of providing enough 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. Specific details about how the class meets the credit hour requirements can be provided upon request.

Technology, devices and classroom participation policy: For my lecture classes, use of computers such as notebooks, iPad and similar devices shall be used just for class activities, PowerPoint, etc. Use of extra-curricular apps such as texting and social media needs to be controlled or closed such that it does not disrupt or distract the classroom environment, classmates or the instructor. Please be professional and courteous in this area of your use of technology in the classroom.

ASSESSMENT AND GRADING

Homework/In Class problems – Homework is worth 20% of your final grade.

Submission: Written homework solutions should be worked neatly in clear logical steps. (Solutions and explanations should be clear enough that one of your peers could easily follow what you did if they had not worked the problem before.)

Collaboration: We expect and encourage collaboration between you and your peers while working on your homework, but your work should be your own original solutions. Allow adequate time to work and think about problems by yourself first before you work together with your peers or ask questions of me. When you sit down to write up a problem, you should not use notes copied from someone else. The guideline is that you should have no trouble explaining or repeating work that you turn in.

Late Work: I generally do not accept late work unless there is a documented emergency. If late work is submitted, the following applies:
Late Submission: Up to one late assignment per quad will be accepted late with a 10% reduction in grade for every day it is late. This begins with a 10% reduction for an assignment turned in later in the day after this homework has been collected at the beginning of class.

Exams – Examinations will be given in class, which count toward 40% of your final grade, consisting of three midterms. The final exam is comprehensive and counts for 25% of your grade. Exams will be closed book. Partial credit will be given for correct reasoning at any step of the 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.

Policy for missed exams: Unless you have express written permission from me long before the date of the exam to take the exam on another day, there will be no makeup exams for this course.

Final Grades – The grade you earn in this course is roughly based on the following scale: 100%-90% A, 90%-88.0% A-, 88%-85% B+, 85%-81% B, 81%-78% B-, 78%-75% C+, 75%-70% C, 70%-68% C-, 68%-65% D+, 65%-61% D, 61%-57% D-. The points you receive during the course are weighted accordingly: in-class quizzes and homework: 35%, exams (4): 40%, final exam: 25%.

The Final Exam will be on: May 4, 2020, Monday, 7:30 a.m.

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 for definitions of kinds of academic dishonesty and for further policy information.

Academic Accommodations:
While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center.
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(DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU ATTENDANCE AND PARTICIPATION POLICY

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 in the Undergraduate Academic Catalog.

Final Exam: Date and Time:

The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that student. **May 4, Monday at 7:30 am.**

PLNU COPYRIGHT POLICY

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FERPA POLICY

In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by (Note: each faculty member should choose one strategy to use: distributing all grades and papers individually; requesting and filing written student permission; or assigning each student a unique class ID number not identifiable on the alphabetic roster.). Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the (undergrad/ graduate as appropriate) academic catalog.

Questions are always welcome and encouraged. The best way to learn is to ask questions and challenge what you are being taught. Feel free to talk to me after class or via email if you have any questions. I hope you enjoy my course!

PSC 1004 Class Schedule (Tentative Spring Schedule, Under Construction)

Week	Date	Topics covered	Chapters, pages
Week 1	01/14	**Tuesday:** Introduction: Cosmos	Introductions
		Chapter 1: Origins and definitions of Astrology	Intro. Of Text
	01/15	Local Neighborhood, Scale for the Universe, History of Astronomy	**Ch 1** 1-9 10-17
	01/17	Chapter 2: Constellations	**Ch 2** 19-26
		Motions in the Sky	28-29
		Seasons	
Week 2	01/20	**MLK Holiday: No Monday class**	
	01/22	Chapter 2: Moon phases Eclipses,	**Ch 2** 26-28
	01/24	Chapter 2: Planetary Motion	31-32
Week 3	01/27	Chapter 3 Science and History	**Ch 3** 37-41
		Theory of Gravity, Newton	41-47
	01/29	Origin of the Solar System	**Ch 4** 55-62
	01/31	Solar System Theory	
		Nebular collapse, stratification	62-71

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Week	***Spiritual Renewal Week***		
4	02/03	Temperature, composition	
		Timeline and ages	71-73
	02/05	**Exam Review**	**Ch 1 – Ch 3, some 4**
	02/07	EXAM #1	
Week			
5	02/10	Earth, Moon and the	**Ch 5** 76-82
		Terrestrial Planets	
	02/12	Histories of the terrestrial planets	82-88
	02/14	Greenhouse effect,	88-91
Week			
6	02/17	Atmospheres, Climate changes	
		Venus vs Earth vs Mars	
	02/19	Outer Solar System	**Ch 6** 95-106
		Jovian planets, moons	95-106
		Rings, and atmospheres	
	02/21	Asteroids, comets and impacts	106-109
Week			
7	02/24	Extinction of Earth's dinosaurs,	
		Planets orbiting other Stars	**Ch 7** 113-120
Week		Extra Solar planets, habitable zones	
7	02/26	Properties of the Sun other stars,	**Ch 8** 128-135
		Sun's evolution,	
	02/28	Classifying the stars	135-142
		High mass stars	
Week			
8	03/02	Stellar Lives, equilibrium	**Ch 9** 146-155
	03/04	Stellar Death, White dwarfs	152-162
		Planetary Nebula	
	03/06	Neutron Stars**, Black** holes	**Ch 10** 166-171
Week **9**	**03/09** **03/11** **03/13**	**Spring Break: no classes** 	**03/09 – 03/13**
Week			
10	03/16	Degenerate matter	169-175
	03/18	and Supernovae Ia	
		EXAM Review	**Ch 4-6, 8-10**
	03/20	EXAM #2	

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Week 11	03/23	Black Holes, Supernova II, GRBs	**Ch 10** 175-176
		Our Galaxy, The Milky Way	**Ch 11** 183-189
		Other Galaxies	189-193
	03/25	Types of Galaxies	
	03/27	How do galaxies differ?	193-194
		Super massive black holes	
Week 12	03/30	Galactic distances	**Ch 12** 198 - 202
	04/01	Exam Review	
	04/03	EXAM #3	
Week 13	04/06	Hubble's Law	**Ch 12** 202-206
	04/08	Super clusters Galaxy evolution	206-208
		Earlier universes	
	04/10	Birth of the Universe, Big Bang	**Ch 13** 213-218
Week 14	04/13	Cosmology, CMB evidence	219-223
	04/15	Very Early universe, inflation	224-225
	04/17	Dark Matter	**Ch 14** 230-237
Week 15	04/20	Gravity, Dark Energy	242-246
	04/22	Life in the Universe	**Ch 15** 250-253
	04/24	Search for life in the universe	254-261
	04/27	Evolution of Life on Earth	**Ch 16** 263 - 267
	04/29	Travel to Space and History	Addendum
	05/01	**Final Exam Review**	
	05/04	**FINAL EXAM – 7:30 – 9:30 am**	

May the Fourth be with you!

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