

CONSORTIUM
of Adventist Colleges & Universities



SYLLABUS

AU: PHYS-110 Astronomy
Summer 2018

AU PHYS 110 Astronomy

Consortium of Adventist Colleges and Universities

Self-Paced Full Term Courses

This is a Self-Paced Full Term course which follows the Andrews semester schedule. Self-Paced Full Term courses have four important dates: 1) a start date, 2) a midterm completion date, 3) a final completion date, and 4) a course completion date. Please note that all module prior to the midterm must be completed BEFORE the midterm and all modules between the midterm and final must be completed BEFORE the final.

Instructor Contact

Please refer to course in LearningHub for the teacher contact information.

Communication with the Instructor

It is important to remember that while the Internet is available 24 hours a day, your instructor is not. You can expect that your instructor will respond to e-mail message to you within *2 business days* during the week and may not be available to respond on weekends.

Other Assistance

Username and password assistance	helpdesk@andrews.edu	(269) 471-6016
Enrollment and withdrawal questions	sderegister@andrews.edu	(269) 471-6323
Technical assistance with online courses	dilit@andrews.edu	(269) 471-3960
Exam requests and online proctoring	sdeexams@andrews.edu	(269) 471-6566
Distance Student Services - any other questions	sdestudents@andrews.edu	(269) 471-6566

Part 1: Course Information

Course Description

Andrews University

Exploring the cosmic environment—the solar system, stars and their development, star clusters, the interstellar medium, galaxies and large-scale features of the Universe. Includes a distance laboratory component and meets the Andrews General Education Physical Science requirement. Does not apply to a major or minor.

Course Prerequisites

Andrews University

MPE P2 or MATH 145 or 166 or STAT 285 or equivalent.

Course Learning Outcomes

- To convey an appreciation of God's creativity and power in designing a universe filled with beauty and capable of sustaining life.
- To spark a life-long interest in astronomy.
- To develop an appreciation for the merits and limitations of the methods of science. Contrasts between science and Pseudoscience and Astrology will be drawn. Our dynamic understanding of the Universe will be especially

emphasized through historical example. Measurement uncertainties inherent in astronomy will be experienced first-hand through laboratory experiments analyzing astronomical data.

- To highlight the appropriate ways in which science informs Christian faith.
- To convey a sense of the scale and grandeur of the Universe and an appreciation of our purpose for being.

Required Text/Material

Army, Thomas, and Stephen E. Schneider. *Explorations: An Introduction to Astronomy*. 7th ed. Dubuque, IA: McGraw-Hill Higher Education, 2014. ISBN: 9780078117985; which includes: Starry Night Access** 9780073513935, Explorations Textbook 9780073512228, E-book 9780077648336.

Astronomy Lab Kit as listed on the online bookstore.

**The software, Starry Night, is used for labs and comes with the new textbook. If purchasing a used textbook, please make sure it comes with a copy of this software.

Lab Materials:

- Bathroom Scale (please supply your own)
- Stopwatch (please supply your own or use your cellphone's stopwatch feature)
- Astronomy Lab Kit as listed in the Andrews bookstore.

NOTE: Purchase textbooks through any online bookstore, such as amazon.com, which can deliver within 2 days. If you need to use financial aid to purchase textbooks, email sdestudents@andrews.edu, cutting and pasting the textbook information from syllabi, including course title and section, your full name and student ID#.

Credit Hour and Commitment

This course is offered for 4 semester credits; therefore it is expected that you will spend 180 hours total on this course. Suggested schedule(s) to accomplish this work are included in this syllabus.

Part 2: Course Methods and Delivery

Methods of Instruction

Methods of instruction include assigned readings from the textbook and the course material, journals, assignments, labs, a reaction paper, a presentation, and two exams. Regular participation in the course is essential to good performance.

Course/Technical Requirements

- Internet connection (DSL, LAN, or cable connection desirable).

LearningHub Access

This course is delivered online through LearningHub at <http://learninghub.andrews.edu>

Your username and password are your Andrews username and password. You need to activate your username and password to access LearningHub.

Please do this online here:

<https://vault.andrews.edu/vault/pages/activation/information.jsp> if you haven't already. If you need assistance, call or email us: (296) 471-6016 or helpdesk@andrews.edu.

If you need technical assistance at any time during the course, or to report a problem with LearningHub, please email dlit@andrews.edu or call (269) 471-3960.

Part 3: Course Requirements

Important Note: Activity and assignment details will be explained in detail within each learning module. If you have any questions, please contact your instructor.

Assessment Descriptions

Textbook Readings: Read the assigned section of the textbook. Though you may feel somewhat overwhelmed by the volume of material from this first pass, the goal of the course is not rote memorization of facts. As you proceed, you will find certain ideas consistently emphasized in the text, the lessons, and the homework. Focus on those key principles.

Lesson Readings: Carefully read the lessons, especially any detailed information or calculational hints. I have deliberately included specific exam preparation material in the lessons.

Assignments/Homework (20% of your grade): Answer the on-line homework questions. Again, many of the exam questions are related to questions you will have encountered in your homework assignments. Your answers to homework questions need not be long-winded and exhaustive. Usually a couple of key ideas with the appropriate terminology will suffice.

Laboratories (20% of your grade): As with any science, astronomy is based on observations of the universe. Some of these observations are made within a laboratory, but many are carried out on very distant objects using telescopes, etc. Apply your knowledge with the on-line laboratories found each week on the LearningHub content page. Each experiment is assigned in conjunction with the corresponding course reading material.

Journals (10% of your grade): Please submit a 3-4 paragraph response to the questions in the dropbox (links on the content page). This is a time to reflect and think on the things you have learned during the week.

Reaction Paper (20 pts; 5% of your grade): You are required to read one article, book chapter or essay relating faith and astronomy and write a two page reaction paper based on your reading. First, summarize the material from your reading and then write your response. For full credit, the paper should include references to at least three sources. Submit your paper as a Word document for grading and plagiarism checks. Details on the style of the paper may be found at <http://www.ccc.commnet.edu/mla/index.shtml> and a sample paper may be viewed at <http://www.bedfordstmartins.com/hacker/pdf/chicago.pdf>. A list of potential articles, book chapters, web-sites, videos and essays are included at the end of this syllabus. You may choose your own topic if you wish, but should check with the instructor first. If you are uncomfortable writing about the relationship between faith and astronomy, you may pursue a topic relating philosophy and astronomy. The rubric for the reaction paper is found below.

Presentation (30 pts; 5% of your grade): Students will summarize the conclusions of their reaction paper in a brief (approximately 10 minute presentation). As a distance-learning student, you will need to videotape your presentation using either a digital video camera, a webcam or a cell phone and upload the video file here for the instructors evaluation. Take pride in presenting your thoughts and the rubric below will be used to evaluate your presentation.

Rubrics

Reaction Paper

	Outstanding - 5	Commendable - 3	Acceptable - 1	Not Acceptable - 0
Introduction	Clearly states essential question and position engaging reader	Clearly states question and position	States question and position	Fails to state essential question or position
Support: Development	Thorough, accurate content that relates to topic and supports position, logical sequence of arguments	Accurate content helps support position	Content related to topic	Lacking in Content
Conclusion	Strong concluding paragraph, summarizes and restates position and highlights of supporting data	Concluding paragraph restating important points	Concluding paragraph	No concluding paragraph
Mechanics	Correct grammar, spelling and diction	Few errors in written English	Generally correct English	Many grammatical or spelling errors

Presentation

	Outstanding - 5	Commendable - 3	Acceptable - 1	Not Acceptable - 0
Introduction	Powerfully introduces the topic and essential question	Clearly introduces the topic and essential question	Introduces the topic and essential question	Does not introduce the essential question
Appearance Rapport	Confident, engaging, at ease	Some confidence, engagement and ease	Adequate engagement	Appearance or gestures distract
Organization and Focus	Material is clearly focused, logical sequencing, timing between 8 and 10 minutes	Material is focused, logical with timing between 8 and 10 minutes	Clear introduction and conclusion and within 8 to 10 minutes duration	Logical sequence missing or unclear. Presentation less than 8 minutes and greater than 10 minutes
Information Content	Information accurate, concise and interesting. Details and examples are used to make information more meaningful	Information accurate and relevant, details and examples are used	Information covers major issues related to topic	Information is inaccurate with important data missing.
Conclusion	Conclusion answers the essential question and summarizes the presenters informed opinion	Conclusion addresses the essential question	Conclusion summarizes thoughts of presenter	Conclusion does not address the essential question and the presenter expresses no opinion
Visual Aids	Skillfully executed visual aids are employed which enhance arguments and present evidence	Competently prepared visual aids are employed	Visual aids are employed	Poor-quality Visual aids distract from issue

Materials Used in the Labs

The following items are used in the lab assignments.

LAB 1: Measurement

- Measuring Tape
- Microsoft Excel (or Libre Office)

LAB 2: Celestial Globe

- Starry Night Software

LAB 3: Size of Earth

- Starry Night Software

LAB 4: Distances and Sizes in Astronomy

- Microsoft Paint (Or alternative for Mac)

LAB 5: Drawing Ellipses

- Paper
- Cardboard
- Thumb Tacks (2)
- String
- Camera/Scanner
- Calculator (recommended)

LAB 6: Mercury Orbit

- Starry Night Software
- Protractor
- Graph Paper (Provided if Printed out)
- Printer

LAB 7: Mass of Jupiter

- Starry Night Software

LAB 8: Acceleration Due to Gravity

- Provided Images
- Microsoft Paint
- Microsoft Excel
- Stop Watch
- Nut/Washer
- String
- Ruler

LAB 9: Spectra

- Microsoft Excel

LAB 10: Lenses and Telescopes

- The Lenses (4 cm and 12 cm)

LAB 11: Radioactivity

- 100 Pennies
- Microsoft Excel (Or a graph with a camera)

LAB 12: Height of Lunar Mountain

- Microsoft Paint

LAB 13: Moon

- Starry Night Software

LAB 14: Solar Rotation

- Microsoft Paint

LAB 15: Blackbody Radiation

- Microsoft Excel

LAB 16: Stellar Properties

- Nothing

LAB 17: HR Diagram

- Starry Night Software
- Microsoft Excel

LAB 18: Hubble Law

- Microsoft Paint
- Microsoft Excel

Exams

Exams must be completed in the presence of an approved proctor without the assistance of books, notes, devices or outside help unless otherwise specified in the exam review and exam directions.

Please review the [current policy on approved proctors](#) before completing the exam request form, which is linked through your course space. It is your responsibility to make arrangements for an approved proctor (unless living near the main campus) and to complete the exam request form at least two weeks prior to each exam date. Bring an official photo ID to show the proctor at the start of the exam session.

The midterm exam is worth 20% of your grade. You are allowed 120 minutes to complete this exam. The final exam is worth 25% of your grade. You are allowed 120 minutes to complete this exam.

If you cannot take your exam within the period noted in the email regarding exam arrangements, email sdeexams@andrews.edu with the reason you cannot meet this deadline, and a proposed alternate time within a week, and prior to the course end date.

Completed exams are never available to you or your proctor. Instructors provide feedback on exams other than the final exam. Exam grades can be viewed in the course space, and the final course grade is included in the University Academic Record accessible through your IVUE page.

Schedule with start, midterm, final and completion dates in RED.

Module	Lessons	Readings	Assignments	Course Objectives Met (example CO2)
Intro	Introduction & Orientation	Orientation Writing Expectations	Submit: Schedule Tell About Me Academic Honesty	
1 May 14-20	Introduction	Read Syllabus Read Why Study Astronomy Read Introductory Lesson Watch Introductory Lecture	Preview Assignment Journal 1	
2	Cycles of the Sky	Read Lesson 1 Read <i>Explorations</i> , Chapter 1 pp. 14 - 37, Cycles of the Sky Watch Lecture 1	Labs 1 & 2 Assignment 1 Journal 2	
3	The Rise of Astronomy	Read Lesson 2 Read <i>Explorations</i> , Chapter 2 pp. 38 – 71, The Rise of Astronomy and Backyard Astronomy Watch Lecture 2	Labs 3 - 6 Assignment 2	
4	Newton's Laws	Read Lesson 3 Read <i>Explorations</i> , Chapter 3 pp. 72 - 87, Gravity and Motion Watch Lecture 3	Labs 7 & 8 Assignment 3 Journal 3	
5	Light, Atoms and Telescopes	Read Lesson 4 Read <i>Explorations</i> , Chapter 4 - 5 pp. 88 - 145, Light and Atoms and Telescopes Watch Lectures 4, 4a, 4b	Labs 9 & 10 Assignment 4 Journal 4	

Module	Lessons	Readings	Assignments	Course Objectives Met (example CO2)
6	Earth, Moon and Time	Read Lesson 5 Read <i>Explorations</i> , Chapter 6 – 7 pp. 146 - 199, The Earth and Moon Watch Lectures 5, 5a, 5b, 5c	Labs 11 – 13 Assignment 5 Journal 5	
7	The Solar System	Read Lesson 6 Read <i>Explorations</i> , Chapter 8 pp. 200 – 223, Survey of the Solar System Watch Lectures 6, 6a, 6b, 6c, 6d	Assignment 6 Journal 6	
8 June 17-21	Midterm Exam - Due on Thursday June 21, by 11:59 PM			
9	The Sun	Read Lesson 7 Read <i>Explorations</i> , Chapter 12 pp. 304 – 327, The Sun, Our Star Watch Lecture 7	Lab 14 Assignment 7 Journal 7	
10	Stars	Read Lesson 8 Read <i>Explorations</i> , Chapter 13 pp. 328 – 359, Measuring the Properties of Stars Watch Lecture 8	Labs 15 – 17 Assignment 8 Journal 8	
11	Stellar Evolution	Read Lesson 9 Read <i>Explorations</i> , Chapter 14 pp. 360 – 389, Stellar Evolution Watch Lecture 9	Assignment 9 Journal 9	
12	Stellar Death	Read Lesson 10 Read <i>Explorations</i> , Chapter 15 pp. 390 – 411, Stellar Remnants Watch Lecture 10	Assignment 10 Assignment 11 Journal 10	
	Milky Way Galaxy	Read Lesson 11 Read <i>Explorations</i> , Chapter 16 pp. 412 – 443, The Milky Way Galaxy Watch Lecture 11		
13	Galaxies	Read Lesson 12 Read <i>Explorations</i> , Chapter 17 pp. 444 – 479, Galaxies. Part I: Ordinary Galaxies Watch Lecture 12	Assignment 12	
	Cosmology	Read Lesson 13 Read <i>Explorations</i> , Chapter 18 pp. 480 – 507, Cosmology. Watch Lecture 13		
14	Cosmology	Read Lesson 12 Read <i>Explorations</i> , Chapter 17 pp. 444 – 479, Galaxies. Part I: Ordinary Galaxies Watch Lecture 12	Lab 18 Assignment 13 Journal 11	
15	Journal 12 Reaction Paper Final Presentation			
16 Jul. 29 – Aug. 2 (11:59 pm)	Semester Exam – Due on Thursday August 2, by 11:59 PM			

Completing Assignments

All assignments for this course will be submitted electronically through LearningHub unless otherwise instructed.

Part 4: Grading Policy

Graded Course Activities

Percent %	Description
5	Journals 1-12
20	Assignments 1-18
20	Labs 1-18
20	Midterm Exam
25	Final Exam
5	Reaction Paper
5	Presentation
100	Total Percent Possible

Viewing Grades in LearningHub

- Click into the course.
- Click on the **Grades** link in the Settings Box to the left of the main course page.

Letter Grade Assignment

Letter Grade	Percentage
A	93-100%
A-	90-92%
B+	88-89%
B	83-87%
B-	80-82%
C+	78-79%
C	73-77%
C-	70-72%
D	60-69%
F	0-59%

Part 5: Course Policies

Withdrawal and Incomplete Policies

The current withdrawal policy can be found online at <https://www.andrews.edu/distance/students/gradplus/withdrawal.html>. The incomplete policy is found online at <http://www.andrews.edu/web/llmsc/moodle/public/incompletes.html>.

Maintain Professional Conduct Both in the Classroom and Online

The classroom is a professional environment where academic debate and learning take place. Your instructor will make every effort to make this environment safe for you to share your opinions, ideas, and beliefs. In return, you are expected to respect the opinions, ideas, and beliefs of other students—both in the face-to-face classroom and online communication. Students have the right and privilege to learn in the class, free from harassment and disruption.

Academic Accommodations

Students who require accommodations may request an academic adjustment as follows:

1. Read the Andrews University Disability Accommodation information at <https://www.andrews.edu/services/sscenter/disability/>
2. Download and fill in the disability form at <http://www.andrews.edu/services/sscenter/disability/accommodationsreqform.pdf>. Preferably type answers. To save a digital copy, 1) print to file and save or 2) print and scan. Email the completed form and disability documentation (if any) to success@andrews.edu or fax it to (269) 471-8407.
3. Email sdestudents@andrews.edu to inform the School of Distance Education that a disability has been reported to Student Success.

Commitment to Integrity

As a student in this course, and at the university, you are expected to maintain high degrees of professionalism, commitment to active learning, participation in this course, and integrity in your behavior in and out of this online classroom.

Commit to Excellence

You deserve a standing ovation based on your decision to enroll in, and effectively complete this course. Along with your pledge of “commitment to Integrity” you are expected to adhere to a “commitment to excellence.” Andrews University has established high academic standards that will truly enhance your writing and communication skills across the disciplines and in diverse milieu with many discourse communities in the workplace.

Honesty

Using the work of another student or allowing work to be used by another student jeopardizes not only the teacher-student relationship but also the student’s academic standing. Lessons may be discussed with other students, tutors may help to guide a student’s work, and textbooks, encyclopedias and other resource materials may be used for additional assistance, but the actual response must be the student’s own work.

Exams must be completed in the presence of an approved supervisor without the assistance of books, notes, devices or outside help unless otherwise specified in the exam directions. The student should have no access to the exam either before or after it is taken. A student who gives information to another student to be used in a dishonest way is equally guilty of dishonesty.

Any violation of this policy will be taken before the Higher Education Academic and Curriculum Committee for appropriate punitive action.

Part 6: Resources for Paper and Presentation

The following resources deal with topics suitable for your paper and presentation. Choose a topic from one source listed below. Your reaction paper and presentation will be based on information and ideas gleaned from the source. If you wish to pursue a topic not covered by any of the sources listed below, please contact the professor and discuss your plans in advance.

Videos

1. Galileo's Battle for the Heavens - Biography of Galileo
2. A Private Universe:
 - a. Preconceived notions interfere with learning
 - b. The Doomsday Asteroid
 - c. Asteroids that could demolish the earth
 - d. Show Me God - Modern Cosmology provides evidence for God
3. Atheism vs. Christianity: Where does the evidence point? Brief History of Time: Stephen Hawking's Bio
4. Science and Religion: An overview (are religion and science at war?)
5. Science and Religion: Let there be light and the big bang
6. Science and Religion: Creation and evolution
7. Beyond the Postmodern Mind: Do materialistic values of science lead to loss of meaning?
8. Faith and Reason: Interviews with scientists for views on science and philosophy
9. Science and the Spirit:
10. Soul:
 - a. Part I: Challenges to Big Bang and the creation of life
 - b. Part II: Knowledge of the Natural World has failed to answer life's important questions.
 - c. Part III: Science cannot decipher all aspects of the human mind
11. Facts of Faith: experiments that teach about God (Elementary School Level)

Books

- "Seventh-day Adventists Believe: A Biblical Exposition of the 27 fundamental Doctrines", General Conference of Seventh-day Adventists, Ministerial Department, 1988. You must interview a local pastor about how flexible (or inflexible) these beliefs are. You may chose to focus on belief #6, Creation.
- "Testimonies", E. G. White, vol. 8, God in Nature, pp. 255 - 261, Pacific Press, 1948.
- "Show Me God", Fred Heeren, Day Star Publications, 1997.
- Ch. 1: Martian Rocks
- Ch. 7: The Bible and the Big Bang
- Ch. 8: Evidences for Design
- Ch. 9: Alternative Explanations for Design
- Ch. 11: Is the Gospel Logical?
- "The Goldilocks Enigma: Why is the Universe Just Right for Life?" Paul Davies, Allen Lane Press (2006).
- "Miracles", C. S. Lewis, Chapter 2 (The Naturalist and the Supernaturalist), Macmillan Press, 1947.
- "Miracles", Chapter 3 (The Self-Contradiction of the Naturalist)
- "Miracles, Chapter 8 (Miracles and the Laws of Nature)
- "Faith, Reason, and Earth History", Leonard Brand, Chapters 9 and 10 (The Case for Megaevolution, The Case for Informed Intervention), AU Press, 1997.
- "Patriarchs and Prophets", E. G. White, Chapter 9 (The Literal Week), Review and Herald Publishing, 1958.

- “Readings in Christian Thought”, ed. Hugh T. Kerr, pp. 64, 65 (Augustine on Space and Time), Abingdon Press, Nashville, 1978.
- “The Case for a Creator”, Lee Strobel, Chapter 5 (Evidence of Cosmology: Beginning with a Bang), Zondervan, 2004.
- “The Case for a Creator”, Lee Strobel, Chapter 6 (Evidence of Physics: The Cosmos on a Razor’s Edge), Zondervan, 2004.
- “The Science of God”, Alistair McGrath, Chapter 2 (Nature), Eerdmans, 2004.
- “Glimpsing the Face of God: the Search for Meaning in the Universe”, Alistair McGrath, Chapter 2 (Trying to Make Sense of Things), Lion Publishing, 2002.
- “The Sacred Cosmos”, Terence Nichols, Chapter 9 (Christianity and Science: Conflict or Complementarity?), Brazos Press, 2003.
- “Theism, Atheism and Big Bang Cosmology”, William Craig and Quentin Smith, Chapters I and II, The Finitude of the Past and the Existence of God; Infinity and the Past), Clarendon Press, Oxford, 2003.
- “Rare Earth”, Peter Ward and Donald Brownlee, Chapter 12 (Assessing the Odds), Copernicus Books, 2004.
- “A Brief History of Time”, Stephen Hawking, Chapter 8 (The Origin and Fate of the Universe), Bantam, 1988.
- “Belief in God in an Age of Science”, J. Polkinghorne, Chapter 2 (Finding Truth: Science and Religion Compared), Yale Press, 1998.

Web Sites

<http://www.reasons.org/articles/design-and-the-anthropic-principle>

Hugh Ross, Design and the Anthropic Principle

http://en.wikipedia.org/wiki/Anthropic_principle

Anthropic Principle

<http://www.leaderu.com/truth/1truth15.html>

Allan Sandage, A Scientist Reflects on Religious Belief. A cosmologist discussing “Proofs” of God.

People

Interview a theologian about how modern astronomy informs his faith or interview an astronomer or physicist about the appropriateness of a relationship between faith and science. You may use the phone or email to conduct interviews.

Articles

“Grappling with Mystery”, M. Kutzner, Adventist Review, vol. 176, Aug. 26, 1999, p. 24. Big Bang and evidence for God.

“The Search for a Plausible Cosmology”, Mart de Groot, Ministry, vol. 72, Nov. 1999, p. 20.

“Cosmology and Genesis the road to harmony and the need for cosmological alternatives”, Mart de Groot, Origins, vol. 19, n1, 1992.

“Genesis and the Cosmos: a Unified Picture?”, Mart de Groot, College and University Dialogue, vol. 17, n1, 2005, p. 15.

- “God and the Big Bang”, Mart de Groot, Adventist Review, vol. 169, Aug. 13, 1992, p. 12.
- “By the Campfire: Red Giants, White Dwarfs, Black Holes and God”, Delmer Johnson, Spectrum, vol. 20, n1, 1989, p. 29.
- “Cradled Science: examining the cosmos in the context of faith”, Del Ratzsch, Journal of Adventist Education, vol. 64, Summer 2002, p. 9.
- “Messages in the Stars”, Raphael Warnick, Message, vol. 48, Oct. 1, 1982, p. 10.
(Warning: an example of perhaps trying to read too much into the sky, without applying the scientific method)
- “Orion Revisited: Part I”, Merton Sprengel and Dowell Martz, Advent Review and Sabbath Herald, vol. 153, March 25, 1976, p. 4.
- “How Open is Orion’s Open Space?: Part II”, Sprengel and Martz, Advent Review and Sabbath Herald, vol. 153, April 1, p. 9.
- “Does the Open Space [in Orion] Exist Today?: Part III”, Sprengel and Martz, Advent Review and Sabbath Herald, vol. 153, April 8, 1976, p. 6.
- “Will the Stars Fall Again?”, M. Kutzner, Adventist Review, vol. 174, Sept. 25, 1997, p. 8