

Azusa Pacific University
College of Liberal Arts and Sciences; Department of Mathematics and Physics
Introduction to Astronomy (PHYC 140); 4 units (Lecture + Lab)
Fall 2014 Course Syllabus

Credit Hours

Following the APU Credit Hour policy, to meet the identified student learning outcomes of this course, the expectations are that this 4-unit course, delivered over the term of one semester (15 weeks) will approximate 3 hours/week classroom and 2 hours/week lab. In addition, out-of-class student work will approximate a minimum of 6 hours/week on homework and studying and 1 hour/week for lab-related activities.

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Textbook: The Essential Cosmic Perspective, 7th edition, Bennett et al, 2014; ISBN 978-0321928085.

APU Mission Statement

Azusa Pacific University is an evangelical Christian community of disciples and scholars who seek to advance the work of God in the world through academic excellence in liberal arts and professional programs of higher education that encourage students to develop a Christian perspective of truth and life.

Department of Mathematics & Physics Mission Statement

The Department of Mathematics & Physics at Azusa Pacific University 1) offers undergraduate degree programs in mathematics and physics, a single-subject waiver for a teaching credential in mathematics, and a pre-degree engineering program; 2) provides general education mathematics and science courses consistent with the outcomes of a liberal arts education; and 3) prepares students for graduate study or success in their chosen careers.

Student Learning Outcomes for PHYC 140:

Mastery of material in this course should enable the following outcomes and objectives:

Student Learning Outcome	IDEA Objective(s)	Assignments Used to Assess
Identify and define basic terms used in astronomy; describe the structure of the solar system and the universe.	Gaining a broader understanding and appreciation of other disciplines	Class/Forum Participation; Projectettes; Quizzes, Tests & Final Exam
Explain the key physical properties of the universe; describe fundamental physical principles associated with celestial objects.	Learning fundamental principles	Class/Forum Participation; Projectettes; Quizzes, Tests & Final Exam; Assignment #3: Research Project & Presentation
Find, recognize and use important science resources.	Learning how to find and use resources; acquiring an interest in learning more	Assignment #1: Magazine Review; Assignment #3: Research Project & Presentation
Articulate areas of perceived conflicts between science & faith; understand key points and possible resolutions.	Learning to analyze and critically evaluate ideas	Class/Forum Participation; Assignment #2: Independent Observation Project & Log Assignment #3: Research Project & Presentation

Course Description

This course introduces the history of astronomy, the solar system, the stellar systems, galactic systems, and cosmology. A lab is included. Introduction to Astronomy meets the general studies core requirement in Nature.

Course Format & Student Expectations

Class & Forum Participation - "...whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report; if there be any virtue, and if there be any praise, think on these things," *Philippians 4:8*. Please bring a positive attitude to class; it will foster community building and make the entire experience more enjoyable for everyone! Students are expected to conduct themselves as responsible adults in a manner respectful of others and of the academic process. Each student in this course must be enrolled in the lab as well. Student attendance at each lecture and lab session is required in order to earn an above average grade. Students should come to class having read the chapters indicated in the classroom schedule, and should be prepared to discuss the topics indicated when called upon in class. Regular posting by each student in the Sakai Weekly Forum Topics is a required and graded element of the class. Cell phones and laptops must be powered off during class, unless specifically authorized by the instructor.

Quizzes, Tests & Final Exam – Ten weekly quizzes, two mid-term tests and a final exam will be given for this course. Weekly quizzes will be administered through Sakai. Mid-term tests will generally be multiple-choice tests, but small portions of the tests may deviate from this format. In an effort to be good stewards of creation, tests will generally be projected onto a screen at the front of the classroom rather than printed on paper. The final exam will be comprehensive, including material covered throughout the course. No make-up tests will be permitted after the in-class test is administered. If for some unforeseen, unavoidable reason it becomes impossible for you to be in class for a test (e.g., death in family or serious illness), you must make every effort to get a message to the instructor before the designated test time notifying her of your absence and requesting arrangements to make up the test. Please do not contact me after the test asking to make it up!

Projectettes - These are short exercises to be done during class. Projectettes will be assigned in class throughout the semester. Projectette dates will not typically be announced. Missed projectettes may not be done outside the original class period in which they are assigned. Therefore, please do not skip class and expect to make them up later!

Laboratory - Your lab scores will count toward the 200 point lab portion of your grade for the semester. General neatness and organization of results will account for part of the lab write-up score. Student attendance and participation in each of the scheduled lab sessions are required. Tardiness to lab is unacceptable.

Assignments – The three major assignments for the course are outlined below. Assignments are considered late if not turned in during the class period in which they are due. Assignments will be penalized if they are late, and may not be accepted at all. PLEASE BE SURE TO VISIT MY WEBSITE (www.leslieannwickman.com) FOR FURTHER INFORMATION AND EXAMPLES OF EACH ASSIGNMENT. In each of your assignments, please use only terms that you fully understand.

Assignment #1 – Astronomy Magazine Review. This assignment consists of reviewing a recent *astronomy periodical* (such as "*Astronomy*" or "*Sky & Telescope*"), briefly commenting on overall content, contributors, advertisements, plus an in-depth (1-page) review of at least one article. Be sure to provide a formal citation for the magazine you review! Target length: 2 pages, 600 words. **Due date:** Week 6.

Assignment #2 – Primary Faith Integration Assignment: Independent Observation Project & Log (IOPL). Each student must complete one of the following five projects, involving at least 8 hours of sky-watching (documented with drawings, diagrams, and/or photographs, *along with textual explanations of what you observed during the full course of the project*), and at least 8 separate, dated journal entries recording his/her personal reflections on what God has to do with astronomy. Include any challenges to your faith that may have arisen during this course and how you have tried to resolve them. These log entries should be subjective, and may originate from your own observations, philosophical or theological ponderings, scripture readings, research, or science journal reading. Look up and reflect on your denomination's position statements on issues relating to origins. If you don't identify with one particular denomination, use one that sounds interesting to you. Your journal entries should also include reflections on biblical scientific foreknowledge, the Big Bang theory, and evolution. This is the "Capstone Project" for this course, and something you may want to add to or refer back to later in life, so get creative and put some effort into it! In order to earn an A or B in this class, you must earn an A or B on this project. Target length: 12 pages (e.g., 4 pages of documented observations + 2 pages of written explanations, + 6 pages of dated written reflections). **Due date:** Week 12, one week before Thanksgiving.

- 1) **Moon-tracking:** Track and diagram/photograph the moon relative to its distance from other celestial (stars, planets) and terrestrial (trees, hills, buildings) objects as it moves through the sky during a full month, noting phases, times, dates, location and all 4 cardinal sky directions (make observations on at least 8 separate nights over a full month, encompassing all the lunar phases). Make sure you observe from the same vantage point for each observation. Could involve moon-rise/moon-set observations, similar to the sunrise/sunset project outlined below.
- 2) **Sunrise/sunset observations:** Track and diagram/photograph the *precise* position on the horizon relative to terrestrial landmarks such as hills, trees, buildings, etc., where the sun rises or sets, or both, once a week for 8 consecutive weeks, noting times, dates, location and cardinal directions, as well as any visible stars or planets. Make sure you observe from the same vantage point for each observation.
- 3) **Planet observations:** Track and diagram visible planets relative to other celestial objects as they move during the course of the semester on at least 8 separate dates spread over at least 8 weeks, noting times, dates, locations and all 4 cardinal sky directions.
- 4) **Apparent motion of the stars:** Observe, diagram, and explain the apparent motions of 4 or more northern asterisms or constellations relative to Polaris (the North Star) during the course of 1 night (e.g., from 8pm to 4am), noting times, dates, location, all 4 cardinal sky directions, horizon landmarks and any visible planets. This should consist of at least 8 hours of observations.
- 5) **Sky Journal:** Keep a journal of your observations of the sky, noting times, dates, location and all 4 cardinal sky directions. Keep a record of asterisms, constellations, and stars that you can identify, as well as locations and appearances of planets and/or meteors, including drawings, diagrams or photographs and brief descriptions. Organize your dated journal entries chronologically, and note changes in positions of celestial objects from one observation period to the next. Your journal should include observations on at least 8 separate dates.

Assignment #3 - Research Project & Presentation. Each student will pair up with one other student, *research a topic relating astronomy to one or both of their a/vocational interests*, and together orally present their research to the class during a scheduled 15-minute period of class time. Examples of worthy topic categories include: the lives and discoveries of famous astronomers; the politics of space exploration; space commercialization; new astronomical discoveries; new astronomy-related technologies; current cosmological theories; human space travel; astronomy in the arts/media; spaceflight benefits to humanity; lesson plans for teaching specific astronomy topics to K-12 students; etc. Alternatively, you and your partner could undertake a space related design research project (e.g., for a new spacesuit, spacecraft, or space habitat). Consult the instructor for topic approval prior to beginning the research project. The presentation should include a *demonstration of a relevant concept*, as well as a *discussion of the importance of this topic to humanity*. Do not lecture from the textbook, or cover information we've already gone over in class. Do not use any more than one carefully selected or prepared short video clip during your presentation. In order to earn an A or B in this class, you must earn an A or B on this project.

Your project will be graded on your in-class presentation, so please make sure to include the following specific elements:

1. **Title Page: topic, student names, date**
2. **Thesis statement**
3. **Evidence and arguments in support of thesis**
4. **Demonstration of a relevant concept**
5. **Importance to humanity**
6. **Conclusions**
7. **Bibliography: print, web, and expert interview (including expert credentials) references**
8. **Peer reviewer name, date.**

The presentation should summarize what you have learned about the topic in doing your research, your personal thoughts about the importance of the topic, and your ideas about what should be done in the future relative to your topic. The presentation must show depth of investigation, and communicate to the audience something about the topic that is not commonly known. Multiple sources must be cited, including AT A MINIMUM:

- one in-print, non-digital book, journal article, or other publication (not the textbook);
- one reliable internet source;
- one personal interview with a non-peer scientific EXPERT on your topic, listing credentials (why does s/he qualify as an expert? I.e., advanced degrees, job title, employer, etc.), date and method of interview (do NOT interview anyone from APU; get started on this EARLY, as it will take some time!)

Your bibliography should incorporate an accepted citation standard, as well as a notation as to where you found each reference. Include your expert interviewee's credentials and the date of the interview in your bibliography. Make sure to thoroughly proofread your document prior to presenting it.

Peer review: Please have one of your fellow students read and critique your document, and note his/her name in your bibliography. Make sure to allow adequate time to incorporate the results of this critique prior to turning it in.

The in-class presentation portion of this project will be evaluated by the audience (other course-enrolled students and the instructor) on each of the following areas:

- 1) Introduction (1-5 pts.): is the opening innovative? does the introduction grab the audience's attention?
- 2) Thesis (1-5 pts.): are the presenters clear about what they are trying to show? is it a significant thesis?
- 3) Evidence (1-5 pts.): how well does the evidence presented support their thesis?
- 4) Engagement/Interaction (1-5 pts.): how engaged/involved is the audience?
- 5) Conclusion (1-5 pts.): are the conclusions reasonable? is there a sense of closure? is the audience convinced?

The project will be evaluated by the instructor on the following:

- 1) scientific content/technical analysis (as opposed to merely history, social commentary, trivia, etc.) (1-20 pts.);
- 2) depth of research (how many and what variety of sources do you use? how deep do you dig?) (1-20 pts.);
- 3) clarity (how clearly are you communicating your work? – visual aids/demos are helpful!) (1-20 pts.);
- 4) creativity/originality of your work and its presentation (did you use a novel way to present an important aspect of your work?) (1-20 pts.);
- 5) thoughtfulness/insight (what does this research mean to you? to humanity in general?) (1-20 pts.);
- 6) documentation (are all elements listed above included? how well do you address each aspect above?) (1-25 pts.).

Due date: Any scheduled classroom date up to and including the final day of class (Week 14), one week prior to the final.

PLEASE NOTE: Meeting just the minimum requirements for any assignment will result in a minimally passing grade. I'm known to be a tough but fair grader, so please put your best effort into your work for this class! You are responsible for understanding the requirements for each assignment.

Extra Credit Opportunities

Several creative opportunities exist for students to earn extra credit points. These include the following:

- 1) In-class presentations of original science-related devotions (science-related devotionals could consist of personal reflections on a scripture passage, a song, or a prayer; an observation of how astronomy inspires worship; or another connection between astronomy and faith);
- 2) In-class presentations of current, astronomy-related news stories (include citations);
- 3) In-class presentations on constellations or asterisms (focus on scientific and technical aspects, such as brightest stars, galaxies, Messier objects, NGCs, asterisms and other features, location in the sky, best viewing times, and, if it is within a zodiacal constellation, how the earth's precession has affected the dates that the sun is found within that constellation. A brief overview of the mythology is also acceptable);
- 4) Written reports on special lectures identified by the instructor throughout the semester, or downloaded from the www.apu.edu/cris/archives/ website.

The in-class presentations must be scheduled ahead of time with the instructor. Points earned will be commensurate with the apparent effort applied (up to a maximum of 5 course points per ***well-written page of your own, ORIGINAL work***). Extra credit, make-up, or any other work will NOT be accepted after the last day of class, which is one week prior to the final exam.

Student Support Services

Student support services are available for students desiring additional support. Use of support services is encouraged through the Math/Physics Tutoring Center, Learning Enrichment Center (LEC), libraries, Media Center, and computer and technology centers.

Disability Statement

Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should meet with an advisor in the Learning Enrichment Center (ext. 3849) as soon as possible to initiate disability verification and discuss accommodations that may be necessary to enable his/her full participation in successful course completion.

Academic Integrity

The mission of Azusa Pacific University includes cultivating in each student not only the academic skills that are required for a university degree, but also the characteristics of academic integrity that are integral to a sound Christian education. It is therefore part of the mission of the university to nurture in each student a sense of moral responsibility consistent with the biblical teachings of honesty and accountability. Furthermore, a breach of academic integrity is viewed not merely as a private matter between the student and an instructor but rather as an act which is fundamentally inconsistent with the purpose and mission of the entire university. A complete copy of the Academic Integrity Policy is available in the Office of Student Life, the Office of the Vice Provost for Undergraduate Programs, and online.

Information Literacy and Use of the Library

Information literacy is defined as “a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (American Library Association, 1989). In this course, teaching and learning processes will employ the following information literacy standards, as endorsed by the American Association for Higher Education (1999), the Association of College and Research Libraries (2000), and the Council of Independent Colleges (2004). The students in this course will:

- Determine the nature and extent of the information needed.
- Access needed information effectively and efficiently.
- Evaluate information and its sources critically and incorporate selected information into his or her knowledge base and value system.
- Individually, or as a member of a group, use information effectively to accomplish a specific purpose.

Some use of library resources will be required for the paper and presentation.

University/Department Policies

All university and departmental policies affecting student work, appeals, and grievances, as outlined in the Undergraduate Catalog and/or Department Handbook will apply, unless otherwise indicated in this syllabus.

Copyright Responsibilities

Materials used in connection with this course may be subject to copyright protection. Students and faculty are both authors and users of copyrighted materials. As a student you must know the rights of both authors and users with respect to copyrighted works to ensure compliance. It is equally important to be knowledgeable about legally permitted uses of copyrighted materials. Information about copyright compliance, fair use and websites for downloading information legally can be found at http://apu.libguides.com/content.php?pid=241554&search_terms=copyright

Plagiarism is a serious offense, and must be dealt with seriously. When writing, one must not take another's work and present it as one's own (this includes copying and pasting text from the internet). It is not acceptable to just change a few words from a passage then use it. If one desires to use another's work, one must quote and cite the passage, or explain and present the ideas in one's own words, and cite the original work.

(Indiana State University offers a nice on-line tutorial on avoiding plagiarism; check it out at this link:

<http://panther.indstate.edu/tutorials/plagiarism/introduction.html>.)

Final Grade Factors

Class/Forum Participation	100
Quizzes (10 @ 10 each)	100
Midterm Tests (2 @ 50 each)	100
Final Exam	100
Projecettes	50
Laboratory Work	200
Assign. #1: Magazine Review	50
Assign. #2: Independent Observation Project & Log	150
Assign. #3: Research Project/Presentation	150
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TOTAL POINTS POSSIBLE	1000

Grading Scale

Points Earned Percent Letter Grade

920-1000	(92+%)	A
900-919	(90+%)	A-
880-899	(88+%)	B+
820-879	(82+%)	B
800-819	(80+%)	B-
780-799	(78+%)	C+
720-779	(72+%)	C
700-719	(70+%)	C-
660-699	(66+%)	D+
580-659	(58+%)	D
540-579	(54+%)	D-

Examples of grading criteria for assignments and final grade:

"A" work - Outstanding

"Above and beyond the requirements of the assignment; outstanding effort, significant achievement, and personal improvement are clearly evident. Some measure of remarkable skill, creativity, or energy is also evident."

"B" work – Above Average

"Fulfills all aspects of the assignment and goes a bit beyond minimum competence to demonstrate extra effort, extra achievement or extra improvement."

"C" work - Average

"Fulfills all aspects of the assignment with obvious competence and grace. Assignments are completed exactly as assigned."

"D" work – Below Average

"Below average either because some aspect of the assignment has not been fulfilled or because a preponderance of errors (more than one or two per page) interferes with clear communication. A "D" may also indicate failure to follow directions, failure to follow specific recommendations, or failure to demonstrate personal effort and improvement."

"F" work – Not Acceptable

"Not acceptable, either because the student did not complete the assignment as directed, or because the level of performance is below an acceptable level for college work."

INCOMPLETES will be dealt with in accordance with University and Department policies.

Course Bibliography of Recommended Reading, Supportive References, and Faith Integration Works

1. Carlson, R. (ed.) 2000. Science and Christianity: Four Views. InterVarsity Press. IL.
2. Chittick, D. 1984. The Controversy. Multnomah Press. OR.
3. Collins, Francis. 2006. The Language of God. InterVarsity Press. IL.
4. Corey, M. 2002. Supernatural Agency and the Modern Scientific Method. Leadership U.
5. Davis, J. 2002. The Frontiers of Science and Faith: Examining Questions from the Big Bang to the End of the Universe. InterVarsity Press. IL.
6. Dembski, W. and J. Kishiner (eds.). 2001. Signs of intelligence: Understanding Intelligent Design. Brazos Press. MI.
7. Easton, T. 1995. Taking Sides: Clashing Views on Controversial Issues in Science, Technology, and Society. Dushkin Pub. Group, Inc. CT.
8. Fischer, R. 1997. God Did It, But How? ASA Press. MA.
9. Grun, B. 1979 The Timetables of History. Simon and Shuster. NY.
10. Hanson, R., editor. 1986. Science and Creation. Macmillian Publishing Company. NY.
11. Hsu, Kenneth. 1986. The Great Dying. Harcourt Brace Jovanovich, Publishers. NY.
12. Hummel, C. 1986. The Galileo Connection. InterVarsity Press. IL.
13. Johnson, Phillip. 2000. The Wedge of Truth. InterVarsity Press. IL.
14. Kaiser, Christopher. 1991. Creation and the History of Science. W. B. Eerdmans Publishing. MI.
15. King, John, translator. 1948. Commentaries on the First Book of Moses Called Genesis by John Calvin. W.B. Eerdmans Publishing Co. MI.
16. Magruder, K. and M. Keas. 1998. Reflections on Science and Faith: Four Theses by Kerry Magruder and Mike Keas. Oklahoma Baptist University. www.okbu.edu/academics/natsci/us/general/sci_faith.htm
17. Marsch, G. 2004. Enlightened Hearts and Cynical Eyes: Why Christian Faith and Doctrine Are Critical Scientific Tools. CCCU. www.cccu.org/resourcecenter
18. Miller, K., editor. 2003. Perspectives on an Evolving Creation. Wm. B. Eerdmans Pub. Co. MI.
19. Moreland, J.P. 1989. Christianity and the Nature of Science. Baker Book House Co. MI.
20. Morris, Henry. 1974. Scientific Creationism. Creation-Life Publishers. CA.
21. Oppenheimer, J.R. 1962. On Science and Culture. Encounter, Oct. 1962.
22. Patten, Donald, editor. 1970, 1971, 1972, 1975. Symposium on Creation: Vols 2-5. Baker Book House. MI.
23. Pearcey, N. and C. Thaxton. 1994. The Soul of Science: Christian Faith and Natural Philosophy. Crossway Books. IL.
24. Ratzsch, Del. 1996. The Battle of Beginnings. InterVarsity Press. IL.
25. Ratzsch, D. 2000. Science and Its Limits: The Natural Sciences in Christian Perspective. InterVarsity Press. IL.
26. Ross, Hugh. 1991. The Fingerprints of God. Promise Publishing Co. CA.
27. Ross, Hugh. 1979. Genesis One: A Scientific Perspective. Wiseman Publications. CA.
28. Sagan, Carl. 1980. Cosmos. Random House. CA.
29. Schaeffer, F. 1972. Genesis in Space and Time. InterVarsity Press. IL.
30. Schaeffer, F. 1975. No Final Conflict. InterVarsity Press. IL.
31. Schaeffer, F. 1976. How Should We Then Live? F.H. Revell Co. NJ.
32. Schroeder, G. 1990. Genesis and the Big Bang. Bantam Books. NY.
33. Stewart, Melville, editor. 2010. Science and Religion in Dialog. Wiley-Blackwell. UK.
34. Strobel, Lee. 2000. The Case for Faith. Zondervan. MI.
35. Thurman, D. 1978. How to Think About Evolution. InterVarsity Press. IL.
36. Van Till, H., D. Young and C. Menninga. 1988. Science Held Hostage. InterVarsity Press. IL.
37. Whitcomb, J. 1986. The Early Earth. Baker Book House. MI.
38. Whitehead, A.N. 1925. Science and the Modern World. Lowell Lectures. Harvard University. MA.
39. Wood, W. 2004. Integrative Topics in Modern Physics. CCCU. www.cccu.org/resourcecenter
40. Wright, R. 2003. Biology Through the Eyes of Faith. Harper and Row, Publishers. CA.
41. Young, D. 1977. Creation and the Flood. Baker Book House. MI.
42. Youngblood, R., editor. 1990. The Genesis Debate. Baker Book House. MI.
43. Youngblood, R. 1991. The Book of Genesis. Baker Book House. MI.

Weekly Classroom Schedule
(Subject to change at Instructor's discretion)

<u>Week</u>	<u>Chapters</u>	<u>Topics</u>
1	1	"A Modern View of the Universe" Course Intro/Outline; Universal Address; Intro to Astronomy
2	2	"Discovering the Universe for Yourself" Scientific Method; Night Sky; Constellations; Scale "Powers of Ten"
3		The Anthropic Principle; Origins & Genesis "Privileged Planet"
4	3	"The Science of Astronomy" Historical Perspective; Early Astronomers; Copernican Revolution; Retrograde Motion; Eclipses "Evidence for God"
5	1-3+	TEST #1 "Facts of Faith" movie
6	4	"Making Sense of the Universe" Newton: Motion, Energy, Mass, Gravity "Gravity of Genius" Magazine Review (Assign. 1) due
7	5	"Light: Cosmic Messenger" Light & Atoms; EMR Spectrum; Spectroscopy; Telescopes
8	6-10	"Learning from Other Worlds" Solar System; Planetary Formation; Terrestrial & Jovian Planets; Exoplanets "Our Amazing Solar System"; SS Walk
9	11-14	"Stars" Sun; Stellar Classification; HR Diagram
10	1-14+	TEST #2
11	15-18	"Galaxies & Beyond" Galaxies, Dark Matter, Dark Energy; Cosmology "Cosmic Perspective"
12	19	"Life in the Universe" Space Exploration; Space Physiology "America in Space" Independent Observation Project & Log (Assign. 2) due
13		NO CLASS - THANKSGIVING
14		Discussion of Astronomy's Importance to Christians and Humanity in General Final Review – Last day to turn in Research Project (Assign. 3)
15	1-19+	FINAL EXAM

Student Score Sheet

1. Class/Forum Participation Score	_____	(100)
2. Weekly Quizzes	_____	(100)
3. Midterm Tests		
Test #1 _____	(50)	
Test #2 _____	(50)	
Sum of Two Midterm Tests	_____	(100)
4. Final Exam Score	_____	(100)
4. Projecettes		
Projecette #1 _____	(10)	
Projecette #2 _____	(10)	
Projecette #3 _____	(10)	
Projecette #4 _____	(10)	
Projecette #5 _____	(10)	
Projecette Total	_____	(50)
5. Labs		
Lab #1 _____	(20)	Lab #2 _____ (20)
Lab #3 _____	(20)	Lab #4 _____ (20)
Lab #5 _____	(20)	Lab #6 _____ (20)
Lab #7 _____	(20)	Lab #8 _____ (20)
Lab #9 _____	(20)	Lab #10 _____ (20)
Sum of Labs	_____	(200)
7. Magazine Review Score	_____	(50)
9. Independent Observation Project & Log Score	_____	(150)
10. Research Project/Presentation Score	_____	(150)
TOTAL	_____	(1000)

Course schedule, topics, evaluation and assignments may be changed at the instructor's discretion.