

PIKEVILLE COLLEGE
COURSE REQUIREMENT SHEET

Course Prefix & Number: PHY 105

Course Title: Introduction to Astronomy and Astrophysics, Lecture

Course Credit Hours: 3 Credits

Official Course Description: A study of the structure and evolution of the universe on different scales. Initially the course will focus on how stars and planets evolve with emphasis on the development of our solar system. The course will then examine the structure and evolution of our galaxy and finally the universe as a whole. The course will also examine how these concepts have changed through the course of history.

Course prerequisites: MTH 099 or placement beyond. Co-requisite: PHY 106.

- Even though the lecture is a separate course from the Physics 106 laboratory, the two courses are directly connected. I do expect that you recall laboratory activities to answer some of the lecture questions.

Professor's Name: Dr. Robert Arts

Professor's Phone Number: 218-5476

- Leave a message if you call; don't assume just because you tried to call that I know that you tried to call.

Professor's E-mail: rarts@pc.edu

- I do not generally check email past 9:00 p.m. So, please do not assume if you send a late message that you'll get a reply that evening. Please plan ahead if you need to ask a question and expect a timely reply
- Also, please at least check for a reply if you send me an email. Far too often I get the question "Did you get my email" and my response is "Yes, I sent you a reply" to which I get the response "Oh, I did not check." So, please don't send me a message unless you actually care about the response!

Professor's Office Location: Room 307
Armington Science Building

Professor's Office Hours: Monday and Friday = 9:00 a.m. - 9:50 a.m.
Monday, Wednesday and Friday = 11:00 a.m. - 11:50 a.m.

- Please feel free to contact me for alternate meeting times if these times are not convenient for you and you wish to see me.

Required Text & Supplies:

- None required....but....I would recommend that, if you wish, you get an astronomy text. While comprehensive lecture notes and PowerPoint slides are available for each topic covered, you may find it necessary to supplement lecture with additional readings. In that event, any general astronomy text will do. I'd personally recommend: Comins, N. F. (2007). *Discovering the essential universe, 3rd ed.* New York, NY: W.H. Freeman.
- Please do not feel obligated to get a text but you are free to do so as well.

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Course Outcomes:

Critical Thinking

Most students take this course, in conjunction with the Physics 106 laboratory, to fulfill a General Education laboratory-science core requirement, so the level of instruction is not as rigorous as a course for students who plan to major in science. However, you will be expected to comprehend fundamental concepts and apply physical reasoning to a variety of situations. Many students find astronomy difficult because it goes beyond memorization by requiring higher level thinking skills (levels 4 through 6 below). Learning astronomy is also like learning a foreign language since new words and symbols must be understood and applied correctly within the context of various astronomical situations.

Bloom's Taxonomy of the Cognitive Domain:

1. Knowledge - memorization of facts, words, and symbols
2. Comprehension - understanding the meaning of knowledge
3. Application - applying concepts to various situations
4. Analysis - breaking apart complex ideas
5. Synthesis - putting individual ideas together to form a complete explanation
6. Evaluation - judging the merits of individual ideas and making decisions

Not only are these skills needed for astronomy, but employers consistently rank critical thinking and problem-solving ability near the top of their list of desired traits in valued employees.

Upon completion of the course the student will have learned to:

- Compare and contrast early models of the solar system. (Analysis)
- Summarize Newton's Laws of motion. (Interpretation)
- Apply Newton's Universal Law of Gravitation to describe the formation and movement of astronomical objects. (Application)
- Analyze the motion of objects in elliptical orbits in terms of Kepler's Laws of Planetary Motion. (Analysis)
- Identify the characteristics of the electromagnetic spectrum. (Knowledge)
- Analyze the use of electromagnetic radiation to measure astronomical distances, movements, and chemical compositions. (Analysis)
- Apply the concepts of gravity and nuclear fusion to the formation of stars of different mass. (Application)
- Relate the mass of a star to the stellar evolution and life cycle of the star. (Evaluation)
- Investigate the characteristics of more massive stars at the end of their life cycle as neutron stars and black holes. (Analysis)
- Consider the impact of distance from the sun on planetary characteristics. (Evaluation)
- Consider the impact of the mass of a planet on its planetary characteristics. (Evaluation)
- Survey the characteristics and dimensions of our galaxy. (Analysis)
- Compare and contrast the Milky Way Galaxy to other galaxies. (Analysis)
- Survey and analyze the scientific data related to birth, expansion, and fate of the Universe. (Analysis)
- Survey and analyze the scientific data related to the possibility of life in our solar system, our galaxy and our Universe. (Analysis)

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Course Contribution to the General Education Outcomes:

1) The Pikeville College graduate will demonstrate effective oral and written communication skills.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by adequately writing answers to essay questions on each of the required examinations and by completing a review of an astronomy-related article.
2) The Pikeville College graduate will demonstrate effective quantitative skills.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by applying specific astronomical equations in order to answer questions within each of the required examinations.
3) The Pikeville College graduate will demonstrate independent and critical thinking.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by performing data analysis, concept application, and information synthesis in their analysis of astronomy concepts.
4) The Pikeville College graduate will demonstrate cultural awareness.	N/A
5) The Pikeville College graduate will demonstrate historical awareness.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by drawing together elements from the history of astronomy in order to build a basis for current understandings.
6) The Pikeville College graduate will demonstrate basic scientific knowledge.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by applying the student's knowledge of science (chemistry, physics, computer science, earth science, and biology) to synthesize the most important concepts in introductory astronomy as they are applied to basic problems that illustrate some of these concepts.
7) The Pikeville College graduate will demonstrate awareness of social science concepts.	N/A
8) The Pikeville College graduate will demonstrate ethical awareness.	N/A
9) The Pikeville College graduate will demonstrate the ability to integrate knowledge across disciplines.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by drawing together elements from history as well as from chemistry, physics, computer science, earth science, and biology.
10) The Pikeville College graduate will demonstrate effective use of technology.	Successful completion of PHY 105 will contribute to a student's being able to demonstrate this outcome by utilizing online exercises and supplementary web links in the completion of required assignments.

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Course Outline:

Day	Date	What Is Going On?
Wednesday	8-20	Lecture = Introduction
Friday	8-22	Lecture = Understanding the Sky
Monday	8-25	Lecture = Understanding the Sky
Wednesday	8-27	Lecture = Understanding the Sky
Friday	8-29	Lecture = Understanding the Sky Quiz #1
Monday	9-1	No Class – Labor Day
Wednesday	9-3	Lecture = The Motions of the Planets Understanding the Sky HW due
Friday	9-5	Lecture = The Motions of the Planets Quiz #2
Monday	9-8	Lecture = The Motions of the Planets
Wednesday	9-10	Lecture = The Motions of the Planets
Friday	9-12	No Lecture! Quiz #3
Monday	9-15	Exam #1 (Understanding the Sky & The Motion of the Planets) The Motion of the Planets HW due
Wednesday	9-17	Lecture = Light & Atoms
Friday	9-19	Lecture = Light & Atoms
Monday	9-22	Lecture = Light & Atoms
Wednesday	9-24	Lecture = Light & Atoms
Friday	9-26	Lecture = The Sun Light and Atoms HW due Quiz #4
Monday	9-29	Lecture = The Sun
Wednesday	10-1	Lecture = The Sun
Friday	10-3	Exam #2 (Light and Atoms & The Sun) The Sun HW due
Monday	10-6	Lecture = The Planets Article Summary due
Wednesday	10-8	Lecture = The Planets
Friday	10-10	Lecture = The Planets
Monday	10-13	Lecture = The Planets Quiz #5
Wednesday	10-15	Lecture = The Planets
Friday	10-17	No Class – Fall Break
Monday	10-20	Lecture = The Planets Quiz #6
Wednesday	10-22	Lecture = Telescopes The Planets HW due
Friday	10-24	Lecture = Telescopes Quiz #7

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Course Outline Continued:

Monday	10-27	Exam #3 (The Planets & Telescopes) Telescopes HW due
Wednesday	10-29	Lecture = Individual Stars
Friday	10-31	Lecture = Individual Stars Quiz #8
Monday	11-3	Lecture = Individual Stars Research Paper Due via "Turnitin" by 9:00 p.m.
Wednesday	11-5	Lecture = Individual Stars
Friday	11-7	Lecture = Individual Stars Quiz #9
Monday	11-10	Lecture = The Ecology of Stars Individual Stars HW due
Wednesday	11-12	Lecture = The Ecology of Stars
Friday	11-14	Lecture = The Ecology of Stars Quiz #10
Monday	11-17	Exam #4 (Individual Stars & The Ecology of Stars) The Ecology of Stars HW due
Wednesday	11-19	Lecture = Galaxies
Friday	11-21	Lecture = Galaxies
Monday	11-24	Lecture = Cosmology Galaxies HW due
Wednesday	11-26	No Class – Thanksgiving Break
Friday	11-28	No Class – Thanksgiving Break
Monday	12-1	Lecture = Cosmology Last day to submit extra credit work!
Wednesday	12-3	Lecture = Life in the Universe Cosmology HW due
Friday	12-5	Lecture = Life in the Universe Quiz #11 Last Day of Class!
Wednesday	12-10	Exam #5 - Final (Galaxies, Cosmology & Life in the Universe) Life in the Universe HW due

- You are responsible for the complete content of the online lecture notes, the lecture PowerPoint slides, and anything said during each lecture. This includes, but is not limited to, any hyperlinks (web pages, images, animations, etc.) that are contained within the online lecture notes or are used during each lecture!

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Course Structure:

This is not an observational astronomy course. We will be meeting MWF week to discuss aspects of astronomy that range from the night sky to life in the Universe.

Assignments

HOMEWORK: Assignments are worth up to 50 points each and are due **at the beginning of class** on the class day following the topic materials completion. There are eleven homework assignments for the semester which you must complete and turn in. Late work will be given a reduced credit, prior to grading, of 10 points for each day it is late; this includes working on the assignment in class the day it is due and/or turning it in at ANY TIME after the beginning of class! Clear explanations must be given for all questions. Reduced credit will result if this procedure is not followed. Further, all homework assignments must be hand written. Homework submitted typed will be returned without credit and marked late if resubmitted in hand-written form. Finally, note that on the top of each homework assignment the following statement appears: *"Please complete the assignment on a separate sheet of paper and staple this sheet to the front of your completed homework. A deduction will result if this procedure is not followed."* This means you need to complete the assignment as indicated and bring it stapled to class. It seems very silly to get a reduced grade on your homework because you did not include the cover page or remember to staple it! Therefore, be certain to plan ahead when completing and submitting your homework assignments.

ARTICLE SUMMARY: Assignment is a review of an **astronomy** article from a 2008 scientific magazine or journal and is worth up to 150 points. The summary includes reading the article, summarizing it, and evaluating it in a logical, clear, and scientific manner. The body of the summary is to be no less than two typed (12 point Times New Roman font, 1" margins, and double-spaced); this does not include the required cover sheet and your views about the article. Thus, the actual summary of the article should be at least two pages long plus an additional paragraph of your views on the content of the article. A copy of the review, including the cover sheet (article title, your name, and the date) and a copy of the article summarized are to be submitted by the due date outlined. Late work will be given a reduced credit, prior to grading, of 10 points for each day it is late.

- The article is to be approved before it is begun. DO NOT email me a link for your article (assuming you retrieved it from an online database) or leave me a message about the article you wish to do. I must see and sign your copy of the article BEFORE you do your summary. An article that does not receive prior approval will NOT be graded and will only be graded upon approval and submission; whether that means that it is late or not. Plan ahead; you know what the due date is!
- Please be careful about the formatting of your article. Most word processors do not have 1" as the default margin. For example, Microsoft Word has a default of 1.25" for the left and right margins. Thus, you will find it necessary to change this in order that you do not receive a deduction for having the wrong margins. Even if you've accounted for this default and typed a bit extra, you will still receive a deduction for not following the formatting directions!

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- Below are some suggested website locations in which to find appropriate astronomy-related articles for your reviews. This is not a comprehensive list nor is it supposed to be the only locations where you can locate astronomy articles.
 - o <http://discovermagazine.com/topics/space>
 - o <http://skytonight.com/>
 - o <http://www.astronomy.com/asy/default.aspx>
 - o <http://www.popsci.com/popsci/>
 - o <http://science.nasa.gov/headlines/>
 - o <http://dsc.discovery.com/news/subjects/subjects.html?category=space>
 - o <http://www.smithsonianmag.com/science-nature/>

RESEARCH PAPER: It seems fitting to give you the opportunity to further study an astronomy-related topic of personal interest. A signup sheet of approved topics will be available within the first week of class to promote early sign-ups and to encourage you to begin your paper as soon as possible! You will conduct library and/or web research in order to write a report about your topic.

Paper Requirements:

The final paper should satisfy the following specifications:

- Use a computer to prepare the report; i.e. it must be typed!
- The main body of the paper must be a minimum of three pages long using the Times-New Roman font, double-spaced, with 1" margins. This length **excludes** headers, footers, page numbering, pictures and diagrams.
- Include sequentially numbered pictures or diagrams (where appropriate) and refer to them specifically in the report.
- Use good grammar, spelling and punctuation.
- Include specific references in your paper for all information used. I.e. cite where you found the information you are using.
- Be sure to include a reference page of the information sources your group used for the topic.

You must use at least THREE unique references for your paper. This page is in addition to the required length.

- Include a cover page on your paper that includes you and your partner's names along with the title of the paper and the date. This page is also in addition to the required length.

- As was the case with the article summary, paper topics are to be approved before you begin writing the paper. You must select a topic from the approved list and actually sign your name on this official list for approval, prior to completing your research. Each student will complete a paper on a different topic; therefore, no two students will be permitted to write on the same topic. Paper topics that do not receive prior approval will NOT be graded, will be returned, and will only be graded upon topic approval and re-submission; whether that means that your paper is late or not. Plan ahead; you know what the due date is!
- The research paper will be submitted to the Turnitin website; this allows for electronic storage and grading of your paper. Instructions for registering on the website can be found on our course homepage. You will need the following information in order to get into our class section of the site: class ID = 2350843 & enrollment password = astro.

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QUIZZES: These assignments are worth up to 50 points each and will be given most Fridays during the **first** five minutes the lecture class. These quizzes will generally be five quick multiple choice questions related to the previous week's lectures. See the online sample quizzes for further assistance.

EXAMS: The four midterms (Exam #1 - Exam #4) are worth up to 300 points each. They will generally consist of multiple choice (slide identification and regular question-type), fill-in-the-blank, true-false, and open response essay questions from each topic covered on the exam. The final exam will be treated as a fifth midterm, with the same structure. See the online sample exams for further assistance.

Tutoring Center:

- Staffed by members of the faculty, staff, and student body, the tutoring center provides a variety of services to Pikeville College students through peer tutoring, computer tutorials in math and English, and a videotaped lecture series in math.
- The Tutoring Center is located in Allara Library, Room 001; it is open Monday through Friday from 9:00 AM to 4:00 PM. All Tutoring Center services are free. You can contact the Center by phoning (606) 218-5602.

Use of Technology:

The course is a lecture format presented using digital computer images, animations, and PowerPoint's. This is NOT an observational astronomy course!

- You may view the course lecture notes by accessing my web page. The URL is below:
<http://campus.pc.edu/~rarts>

Select "The Courses I Teach" then "Physics 105 - Introduction to Astronomy & Astrophysics" to access the Astronomy Course Home Page. When accessing the "Lecture Notes, Homework Assignments, Sample Quizzes, and Sample Exams" you will need to use the following user name and password:

User Name: _____

Password: _____

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Course Requirements & Evaluation:

The final course grade will be based on the breakdown below:

Homework:	550 points (11 homework assignments at 50 points each)
Article Summary:	150 points (1 summary at 150 points)
Research Paper:	250 points (1 paper at 250 points)
Quizzes:	550 points (11 quizzes at 50 points each)
Exams 1-4:	1200 points (4 exams at 300 points each)
Final:	<u>300 points (1 final exam at 300 points)</u>
TOTAL:	3000 points

** Grade Determination Scale: The grade scale for the class is based on the point scale listed below which follows a 10% grade range:

<u>Grade Range (Points)</u>	<u>Grade Range (Percentage)</u>	<u>Letter Grade</u>
3000 - 2700	100.0% - 90.0%	A
2699 - 2400	89.9% - 80.0%	B
2399 - 2100	79.9% - 70.0%	C
2099 - 1800	69.9% - 60.0%	D
1799 - 0	59.9% - 0.0%	F

- Your final average in the class will include the points from any extra credit that you complete. Extra credit can only serve to help move you into a higher grade bracket.
- I reserve the right to move you into a higher grade bracket, if you have achieved a border-line grade and it is deemed appropriate.

Late Assignment Policy: As all the material is important to your understanding of the course, absence from the lecture requires you to make up or submit any missed assignments. I will only give permission for a make-up provided a valid excuse is presented within **24 hours** of the missed assignment. In addition, if you are aware of an upcoming lecture meeting that will be missed due to prior obligations, please contact me ahead of time to make arrangements to complete or turn in any assignments that are due that day. I acknowledge that many of you have additional responsibilities outside of this class (work, family obligations, school functions, etc.). However, this is no excuse for missing class and/or missing class work. Do not assume that I will ask you to make up or submit any missed work; because I will not. It is your responsibility to contact me and make these arrangements! Finally, if you are aware that you will not be in class on the day when an assignment is due, you are still responsible for submitting that assignment on time! This means that you have three options:

- Submit the work early
- Send your work with a friend to drop off for you
- Understand that there will be a deduction if you submit the assignment when you return (after the due date).

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Missed Exam/Quiz Policy: In addition to following the "late assignment policy" outlined previously, any quiz/exam that is not attempted during the designated class time (ex: a make-up quiz/exam or a quiz/exam taken early) will follow a different format than that outlined in previous descriptions. Generally speaking, any and all make-up/advanced work will be 100% essay-type questions (open response).

- For example, if you show up to class late and everyone else has already finished their quiz/exam and the lecture has begun you will be required to take the open response make-up quiz/exam. If you are late and the quiz/exam is still going on then you're okay and will be given the opportunity to take the same quiz/exam as everyone else! No matter which scenario occurs, the actual lecture may not wait for you to finish since I will not delay everyone because you were late but at least you'll have the benefit of completing the quiz/exam.

Attendance Policy: All the material is important to the student's understanding of the concepts presented. In addition, the pace of the class is quite rapid. Therefore, students are strongly encouraged to attend all classes. Failure to attend class will only serve to hurt your chances in the course. If you cannot attend a scheduled class meeting, please contact me or the division secretary (218-5460) prior to your absence.

Withdrawal Policy:

- From the first day of class until the *Last day to receive a grade of "W"* (see the Academic Calendar for this specific date), you may officially withdraw from a class and receive a grade of W. However, in the unlikely event that you wish to withdraw from the course I'd appreciate you contacting me first. I will do what I can in order to help keep you enrolled in the course; if there is anything that can be done.
- After this cutoff date through the end of class work (again, see the Academic Calendar for the specific date), I will allow you to withdraw with a grade of "WP" only under extraordinary circumstance such as illness, accident, etc. If you have stopped showing up, have not contacted me, and wish to withdraw after the "W" date, then I will not be as receptive to helping you and you may simply have to live with the consequences of your actions; i.e. receiving an "F" or a "WF." You are an adult and I will treat you as such. From the same standpoint, if you treat me with the respect I deserve than I will be willing to do the same for you. Please keep an open line of communication at all times regarding your involvement in this course.

Academic Conduct: "Instances of plagiarism or academic dishonesty may result in the student receiving a failing grade for the activity, being requested to withdraw from the course (W) (WP) (WF), or receiving a failing grade for the course according to the perceived intent and extent of the instance(s) of academic dishonesty."

- This means don't copy your friend's homework essays! Do your own work!

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ADA Information:

- Pikeville College is committed to providing students with disabilities the same educational programs and services offered other students, in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. Under Section 504, a student has a disability if that individual has a physical or mental impairment that substantially limits major life activities such as walking, seeing, hearing, speaking, working, or learning. Section 504 further requires that institutions make appropriate and reasonable adjustments for students with disabilities to ensure accessibility to academic and nonacademic activities. Under ADA, all institutions of higher education must comply with government policies, procedures, and employment practices that impact the treatment of students. If you have a disability that warrants special accommodation within this course, please contact the Disabilities Resources Office located in the Student Services Counselor's Office.

Extra Credit:

*** Extra credit for the course will be available in the following forms:

- Research Paper: The body of the text must be at least 3-5 typed pages long (12 point Times New Roman font & 1" margins, double-spaced); this does not include the required cover sheet and reference page. You must include a cover page (the paper's title, your name, and the date). You must use at least three unique references (included on a separate reference page). The paper can be biographical, historical, or subject oriented. Each paper is worth up to 15 points.

- The topics/sources for the papers are to be approved by me prior to their onset. Points are awarded based on the, completeness of work, accuracy of work, etc.

- Article Summary: These are additional article summaries beyond the two required for the course. Please see the article summary section of the course requirement sheet for the formatting instructions. The extra credit article summaries are worth up to 10 points each.

- Out-of-Class Assignment: Occasionally, particular topics have practical applications to real world astronomy observations. For these topics, I will have out-of-class assignments available that will help to physically demonstrate and/or observe a concept. A set of observations and/or experiments will accompany the assignment and will require a detailed write-up for credit to be awarded. Specific details are included with each assignment. Each assignment is worth up to 15 points.

- Quiz Rework: Upon receipt of a graded quiz, you may rework the quiz in its entirety **on a separate sheet of paper**. The rework should include the complete explanation of all the missed questions. Citing page numbers or definitions are typical ways to justify an explanation. Rewriting the questions is not required. Quiz reworks are worth up to three (3) points each. Points are awarded based on the completeness and accuracy of the rework. Reworks are to be **turned in within one week** after the initial graded quiz has been returned; I will not accept them after that time so please do not ask. Finally, the rework **MUST** be accompanied by the original quiz (i.e. the quiz being reworked must be stapled to the rework).

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- The points generated from the extra credit will be credited to your overall course grade. The most extra credit possible, in any combination of the previous forms, is 100 points. These points will be directly added to the total number of points accumulated in the course. Failure to do the extra credit assignments will not lower your grade in any way. They are intended to help you not hurt you.

Cell Phone Policy:

You are permitted to have your cell phone with you in lecture. However, the cell phone MUST be either set to vibrate or turned off; I do not want to hear it ring nor do you really need to have it out at all. Further, unless you are expecting an emergency call, and have cleared it with me ahead of time, you are NOT to answer your phone during lecture time. This also includes sending text messages during lecture time. You'll get one warning if any of these inappropriate actions occur; after which you will be asked not to return to lecture.

iPod Policy:

You are NOT permitted to listen to your iPod during lecture!! While you are in lecture you are supposed to be listening to the lecture, not something else. As with the cell phone policy, you will get one warning if this inappropriate action occurs; after which you will be asked not to return to lecture.

Final Thoughts:

Studying for Exams and Quizzes:

On the course web page I have provided you with sample exams and quizzes; both of which contain a key. DO NOT assume by simply taking or memorizing these samples that you will be able to pass the in-class exams or quizzes. They are provided as examples of sample questions relevant to the course material NOT necessarily the questions you will definitely see. Certainly those questions are good ones and they may show up on an in class exam or quiz but do not assume so. Read the notes, come to class, pay attention, and generally attempt to study the material covered for each exam or quiz. In addition, I have provided you with the essays for each exam. There are several possibilities listed for each exam and you WILL be answering one of these on your individual exam; my choice, not yours, so study them ALL. No, they do not have the answers listed nor will I provided them for you. You must read the notes and answer them for yourself! Basically, STUDY!!

Disclaimer:

The schedules and policies associated with this course may be subject to revision or change as a consequence of changing circumstances or events. I will provide you with reasonable notification prior to any major changes in course policies or procedures.

Course Requirement Sheet Acknowledgment Form

I, _____, have received a copy of the Course
(Printed Name)

Requirement Sheet for Physics 105 - Introduction to Astronomy and Astrophysics,
Lecture and understand all the policies and procedures outline therein.

(Signature) (Date)

Please fill out the information requested below:

Major: _____

Contact Phone Number: _____

E-mail Address (the one you actually use): _____

Medical information that I should be aware of: _____

Comments: _____

- This Course Requirement Sheet Acknowledgment Form is to be filled out and returned to me by the end of the first class period!