

HISTORY OF THE UNIVERSE

Description: Provides students with an understanding of the role the scientific process has in explaining the history of the universe. We will learn about planetary and stellar motions, their life histories, the importance of astronomical observations and the role of light in obtaining information about the universe, and the origins and nature of stars, galaxies and the universe itself.

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Office Hours: MTWF 10:00 - 10:30 a.m. & M-F 1:00 – 1:30 p.m. Feel free to come by at any other time too! If I'm in, I'll be happy to address any questions or concerns you may have.

Textbook: *Discovering the Universe* by N.F. Comins and W.J. Kaufman (6th edition, W.H. Freeman & Co). The text is available in the bookstore. From time to time, I shall hand out essays, articles or other handouts to supplement the material in the textbook.

Website: URL: <http://knowledge.udmercy.edu/>. You should plan to look up the course website at least once a week. On the website, you can access the lecture notes, solutions to assignments, and general course information.

Lectures: MWF 11:00 - 11:50 a.m. A tentative syllabus for the semester is provided to you along with this sheet. The syllabus may be revised from time to time during the semester.

Prerequisites: There are no formal prerequisites for this course. There will be some mathematics involved in the course including simple algebra and the understanding of proportions and scientific notation ($1000 = 10^3$).

Objectives: This course is intended to provide you with an understanding of the history and evolution of the universe and its many constituents – planets, stars, galaxies etc. You will also gain the basic knowledge needed for amateur astronomy. I will supplement the lectures with demonstrations and videos, as appropriate.

Outcomes: Through this course, you should be able to

- Understand and apply the tools and techniques of amateur astronomy, including star charts, constellation maps, binoculars and telescopes, celestial coordinates etc.
- Analyze the causes and effects of celestial motions, including that of the Earth and other planets, the sun, the moon, stars and galaxies.
- Understand and predict the properties of planets, stars, and galaxies based on the information received from these sources.
- Learn the ideas behind the formation of the Earth and other planets, including cycles of the Earth, plate tectonics, ecosystems and environmental issues.
- Appreciate the beauty and harmony inherent in our universe through a study of the life cycles of planets, stars and galaxies.

Homework: Problems sets will be assigned every week. Some of the problems may appear verbatim on the exams. Therefore, it is in your best interest to understand and solve the homework problems. Homework is **DUE AT CLASS TIME**, and will be returned to you in a later

lecture. Be sure to hand in your assignments on time because **LATE ASSIGNMENTS WILL NOT BE ACCEPTED!** Homework constitutes 20% of your final grade. One lowest homework score will be dropped in calculating your grade.

Project: There will be one assigned term-project worth 15% of your final grade. Details of the project will be provided to you in class.

Participation: Attendance and participation in the in-class discussions is very important. Without this, you cannot hope to gain much from this course. I may take attendance in class from time to time! Every two unexplained absences will cost you 1% of your grade up to a maximum of 10%. Class participation will be worth 10% of your final grade. Good participation involves:

- a) Coming to class on time and staying till the end of class.
- b) Acting in a responsible, respectful and courteous manner while in class.
- c) Actively participating in in-class discussions and other activities.

Exams: The course will include two in-class one-hour exams and a final exam as scheduled by the university. Each one-hour exam will be worth 15% of your final grade and will emphasize conceptually distinct portions of the syllabus. The final exam will be comprehensive and worth 25% of your final grade. As a rule, exams given later in the semester will expect you to remember important concepts presented earlier in the semester!

Exam Dates: Exam #1 - Monday, 10/10
Exam #2 - Monday, 11/7
Finals - Tuesday, 12/10, 11:00 a.m. – 12:50 p.m.

Grading:

90-100	: A	65-69	: C+
85-89	: A-	60-64	: C
80-84	: B+	55-59	: C-
75-79	: B	50-54	: D
70-74	: B-	<50	: F

Remember: September 9 : Last day to add a class
September 26 : Last day to drop a course without a "W"
October 21 : Mid-term grades due
November 21 : Last day to withdraw from class

Honesty: The fundamental assumption under which the University operates is that work submitted by a student is the product of her or his own legitimate efforts. In other words, make sure the assignments (homework, exams etc) you submit reflect your own work! Any student suspected of cheating or plagiarism will be dealt with according to the policy set out in the Engineering and Science Student Handbook.

Course Syllabus

DATE	TOPICS	READING
Week 1: 9/1	Introduction to Astronomy	Chapter I
Week 2: 9/8	Motions of the Earth	Chapter 1
Week 3: 9/15	Motions in the Universe	Chapter 1
Week 4: 9/22	The History of Astronomy	Chapter 2
Week 5: 9/29	Light and Telescopes	Chapter 3
Week 6: 10/6	Radiation and Spectra	Chapter 4
<i>Friday 10/10</i>	Exam – I	Chapters I, 1-4
Week 7: 10/13	Introduction to the Solar System	Chapter II
Week 8: 10/20	The Earth and Moon	Chapter 5
Week 9: 10/27	Cycles of the Earth	Chapter 5
Week 10: 11/3	The Other Terrestrial Planets & The Sun	Chapters 6, 9
<i>Friday 11/7</i>	Exam – II	Chapters II, 5, 6, 9
Week 11: 11/10	The Life Cycles of Stars	Chapter 11
Week 12: 11/17	The Death of Stars	Chapters 12, 13
Week 13: 11/24	The Universe	
<i>Friday 11/28</i>	Thanksgiving Holiday	Chapters IV, 15, 16
Week 14: 12/1	Introduction to Cosmology	Chapter 17
Week 15: 12/8	Final Exam Week	
<i>Wednesday 12/10</i>	Final Exam	Chapters IV, 11-13, 15-17

Project Sunset Point

Introduction

This fun exercise will illustrate the motion of the sun throughout the year by tracking the point on the horizon at which the sun sets (or rises). **CAUTION:** For this project, you will have to observe the sunset or sunrise at least once a week. You cannot leave this project until the last minute. Be prepared to bring your project to class when requested! I will provide you with project deadlines later in class, during the second week of classes.

Procedure

1. Go outside at any time of the day and draw your western horizon. (Note: if you're a morning person, you may want to watch the sunrise instead of the sunset. For you early birds, draw the eastern horizon, and in the following description, replace "evening" with "morning", "set" with "rise", and "west" with "east").
2. Continue marking the sunset point throughout the semester **from the same spot!** Mark the sunset at least once a week. I will check your work periodically to make sure you understand the project, and are making satisfactory progress. Please be prepared to bring your drawing to class. Failure to do so will cause you to lose points on the project.
3. Make a table showing the time and date of each sunset. In a separate column, note the color of the sun at each sunset. What determines the color of the sun when it sets?
4. Try to mark the sunset over the next few days (until around September 23). This date has astronomical significance (no pun intended!).
5. Plot a graph of the time of sunset versus the date (from your data table above). Comment on the shape of the graph.

Final Write-up

This project is due in class on the Monday before Finals week. Hand in your drawing, with the sunset points labeled with time and date. Write a short report (1-3 paragraphs) of your findings. Attach your graph to the report. Your report should address the following questions:

- 1) Does the sun set at the same point on the horizon every evening?
- 2) Does the sun set due west every evening?
- 3) In which direction is the sunset moving (north or south)?
- 4) By approximately how many degrees does the sun move across the horizon each day?
- 5) What causes this motion?
- 6) When (if ever) will the motion of the sunset point appear to reverse direction?
- 7) What implications does all of this have for us on Earth?

Final Note

Feel free to discuss the project and the above questions with others in class, the instructors, or friends. However, the drawing and final report must be your own work, in your own words! Do not copy anyone else's report or drawing. This project is worth 15% of your final grade.