

NIU *PHYS 162H – Elementary Astronomy, Honors Section*, Spring 2017

Syllabus

(The latest version of this document can be found under [Information](#) on the course's [Blackboard page](#).)

Course Description: An elementary introduction to astronomy including the solar system, stars, galaxies, exotic objects such as black holes, active galactic nuclei, dark matter etc., and an overview of current topics in cosmology.

Credit hours: 3

Course objective: We shall see how the night sky has fascinated humankind throughout our history, how the tools developed for the study of astronomy have benefited and enriched our everyday lives, how the knowledge gained has transformed our understanding of the origin of the universe and our place in it. We'll also see how simple observations can lead to extraordinary revelations if we keep our minds open, think logically, and base our conclusions on rigorous analysis of data. And we'll see how the features and phenomena on the largest scales of the universe are connected crucially to the smallest building blocks of nature and interactions among them. Along the way, we'll come across numerous instances where truth is indeed stranger than fiction. The course should be a lot of fun if you come with an unprejudiced and inquisitive mind, enjoy learning, and are prepared to put in a reasonable amount of work (proportional to the number of credit hours).

Learning outcome: At the end of the course, the students will have gained a basic qualitative understanding of

- the history and motivation behind the study of various objects and phenomena in the sky,
- the instruments and methodology employed in those studies; ongoing efforts to improve them,
- the current state of knowledge, understanding, and theories about the origin, ingredients, features, and phenomena of our solar system,
- different classes of stars – their characteristics and life cycles,
- galaxies of various types, their visible and invisible components, dynamics, evolution, interactions, etc.
- Cosmology: the largest structures and evolution of the universe based on the Big-bang theory,
- thoughts and investigations on extraterrestrial life.

Prerequisite: None. However, knowledge of basic high-school science and math, including algebra but not calculus, will be assumed.

Course web pages: BlackBoard: <https://webcourses.niu.edu/>, Top Hat: <https://app.tophat.com/e/583337>
Students are expected to stay up-to-date with the contents of either page throughout the semester.

Class meeting times: Tu, Th 09:30 - 10:45

Classroom location: Faraday 205

Instructor: *Prof. Dhiman Chakraborty*. E-mail: dchakrab@niu.edu, dhiman.chakraborty@gmail.com

Instructor Office Hours: Tu, Th 12:30 pm - 1:30 pm, FW 220 (or by appointment).

Observatory: The night of every second thursday of the month, if the sky is clear, Davis Hall (TBC). See <http://www.niu.edu/physics/observatory/>. **Observatory manager:** *Gregory Alley*, Gregory.alley@niu.edu

Textbook: [Discovering The Essential Universe \(6th Ed.\), by Neil F. Comins](#). Any version: bound (paperback) / loose-leaf / electronic is fine. Also available as e-book on VitalSource (formerly CourseSmart): <https://www.vitalsource.com/>.

Additional requirements:

- Access to *MacMillan Launchpad*. For more information, visit the textbook web site: <http://macmillanhighered.com/Catalog/product/discoveringtheessentialuniverse-sixthedition-comins>
- Subscription to *Top Hat*: <https://tophat.com/>. Join code for this course: **583337**
 - We'll use the Top Hat classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.
 - The Student Quick Start Guide <http://tinyurl.com/THStudentGuide>, has instructions to help you register for a Top Hat account. It also contains a brief overview to get you up and running on the system. To register, visit the site for this course: <http://tophat.com/e/583337>.
 - Top Hat will require a paid subscription, and the standard pricing for the cheapest option is \$24 for 4-months of unlimited access. For a full breakdown of all subscription options available please visit <http://www.tophat.com/pricing>.
- In order to take maximum advantage of functions offered by Top Hat, students will find it extremely useful to bring a smart device, such as a laptop, tablet, or smart phone, with wireless internet access, to every lecture. However, use of such devices for any other purpose during the lectures is strongly discouraged. Students without access to such devices will be offered alternative means.

Other resources:

- NASA: <https://www.nasa.gov/>
- HubbleSite: http://hubblesite.org/explore_astronomy/
- Wikipedia list of Astronomy web sites: https://en.wikipedia.org/wiki/List_of_astronomy_websites

Assessment:

Student Performance Assessment (basis of grading):

- **Homework:** 14 assignments (one for each week of class, except the last) – 10 points each. Assigned after class on every Thursday, due before class the following Tuesday. Two worst scores will be dropped. **120 points**
- **In-semester exams:** 5 exams, 24 points each, one after every three weeks of class (roughly). **120 points**
 - Exam 1 – Early observations, gravitation, tools of astronomy – Chapters 1-3: [Feb 09](#)
 - Exam 2 – Formation of the solar system, exoplanets, terrestrial planets and their moons - Chapters 4-6: [Mar 02](#)
 - Exam 3 - Vagabonds of the solar system, outer planets and their moons, the Sun - Chapters 7-9: [Mar 30](#)
 - Exam 4 - Stars - Chapters 10-12: [Apr 20](#)
 - Exam 5 – Galaxies, cosmology, astrobiology - Chapters 13-15: [May 04](#)
- **Quizzes:** 7 pop quizzes – 10 points each. The worst score will be dropped. **60 points**

- **Reading reports:** 2 papers (3-4 pages each, double spaced, submitted on Blackboard) - 25 points each. Due [March 09](#) and [April 27](#), respectively. Topics must be e-mailed to instructor for approval 3 weeks before due date (so, by [February 16](#) and [April 6](#), respectively). **50 points**
 - **Paper 1:** Report on a factual news story published in the past three years about a telescope or artificial satellite and its mission. OR Report on a fictional account of a star, planet(s), or moon(s) in a book, movie or TV show and its comparison with real life.
 - **Paper 2:** Report on any web page discussing any type of astronomical phenomenon or object other than stars or planetary systems. OR Report on a visit to the observatory.
- **Final Exam:** Covers all chapters: [May 11 \(10:00 – 11:50 am\)](#). **50 points**

Total: 400 points (not including extra credit)

- **Extra credit:** Attendance: 1.5 points for each meeting of the class. **45 points**

Grading scheme:

360-400+	340-359	320-339	300-319	280-299	260-279	240-259	200-239	0-199
A	A-	B+	B	B-	C+	C	D	F

Course assessment: In addition to the above items, a few quizzes will be given to assess how well the course is achieving its goals. These will be recorded anonymously and will not affect student grades.

Class schedule: The sequence of topics is the same as in the textbook:

Week (of)	Tuesday	Thursday
1 (01/16)	0. Introduction, syllabus, entrance evaluation	1. Discovering the Night Sky (Part 1 of 2)
2 (01/23)	1. Discovering the Night Sky (Part 2 of 2)	2. Gravitation and Planetary Motion (1/2)
3 (01/30)	2. Gravitation and Planetary Motion (2/2)	3. Light and Telescopes (1/2)
4 (02/06)	3. Light and Telescopes (2/2)	<i>Exam 1</i>
5 (02/13)	4. Formation of the Solar system (1/2)	4. Formation of the Solar system (2/2)
6 (02/20)	5. Exoplanets	6. Terrestrial Planets and Their Moons (1/2)
7 (02/27)	6. Terrestrial Planets and Their Moons (2/2)	<i>Exam 2</i>
8 (03/06)	7. The Outer Planets and Their Moons (1/2)	7. The Outer Planets and Their Moons (2/2)
9 (03/20)	8. Vagabonds of the Solar System	9. The Sun (1/2)
10 (03/27)	9. The Sun (2/2)	<i>Exam 3</i>
11 (04/03)	10. Characterizing Stars	11. The Evolution of Stars (1/2)
12 (04/10)	11. The Evolution of Stars (2/2)	12. End States of Stellar Evolution (1/2)
13 (04/17)	12. End States of Stellar Evolution (2/2)	<i>Exam 4</i>
14 (04/24)	13. Galaxies (1/2)	13. Galaxies (2/2)
15 (05/01)	14. Cosmology (& Astrobiology?)	<i>Exam 5</i>

All exams and quizzes, except the final exam, will be given during normal lecture hours.

Course Policies, Accommodation and Advice:

- Students are strongly encouraged to seek one-on-one consultation with the instructor for any need related to the course. Phone or e-mail can be used if schedule conflicts prevent in-person meetings. The more time one spends on the course, the more fruitful those sessions will be.
- Efforts will be made to communicate all important announcements relating to the course either by e-mail or by posting on the course pages on Blackboard/TopHat. In addition to paying prompt attention to notifications, students should make it a habit to visit those pages frequently – at least once the afternoon before each class. However, some announcements may also be made verbally during lectures, and not communicated in writing. If a student is absent during any part of a lecture, it is her responsibility to follow up with the instructor to be sure that she did not miss any announcement. Ignorance of any announcement – written or verbal – shall not count as an excuse.
- Attendance will be taken at a random time during each lecture and used in calculation of extra credit. Pop quizzes will be taken at random times during some classes, the dates of which will not be announced in advance.
- Students are strongly encouraged to eschew late arrival to or early departure from the class. However, in case one cannot avoid entering or exiting the lecture hall while a class is in session, he/she should do so as quietly as possible in order to minimize distraction to others.
- No late submission of homework assignments or papers will be accepted and no make-up work will be offered for missed attendance, quizzes, or exams, *unless* a valid excuse is presented in official writing by an authorized party (e.g. a doctor's note supporting absence from class due to illness or a medical procedure, or the head of a unit requesting advance permission for a student to be absent on certain days – see under **Attendance** below). Such excuses should be submitted in advance of the absence, if possible, but no later than within a week after returning to class.
- To get the maximum out of each lecture, come prepared by reading in advance the part of the textbook that is going to be covered in class that day.
- The course has neither a teaching assistant, nor any mandatory laboratory session. However, all students are strongly encouraged to visit the NIU Observatory (see above) at least once during the semester. Looking at the sky on one's own in order to enhance the learning experience is also encouraged, but one must take reasonable precautions: don't look directly at the Sun, even when it doesn't appear too bright (e.g. in the early morning or late evening, during a solar eclipse, or through a veil of cloud), don't perch yourself or any instrument at a location where either may be at a risk of falling, choose a safe location and time for observations, especially at night etc. Remember, it is rather easy to forget about your surroundings when you're absorbed in observing something.
- Last, but not the least, be respectful and courteous to others in the class. Use of "smart" devices - such as laptops, tablets, or smart phones - in class is encouraged only for legitimate purposes of the course. They should not be used for entertainment or communication while the class is in session. Everyone needs to do his/her part to help make the atmosphere in the classroom as conducive to learning as possible.

Attendance: Attending lectures will be very important to those wishing to do well in the course. Attendance will be taken at a random time during every lecture and used to award extra credit. If a student is absent from classes for a week or more because of an accident, illness, or other emergency, instructors are not notified of the absence unless the student or her parents request it through the Division of Student Affairs. Health Services will not release information about students unless they provide a written request.

In the case of an absence due to required attendance at a university-sponsored event such as a department trip, performing arts activity, ROTC function, or athletic competition, reasonable attempts shall be made to allow the student to make up missed work. Students are responsible for completing the work assigned and/or due on the days they are absent for university-sponsored events. Both the sponsoring unit and the student should inform the instructor as soon as possible in the semester in order for arrangements to be made for completing missed assignments, examinations or other required course work. Students are required to provide the instructor with official notification in advance of the absence (e.g., a letter from the chair of the sponsoring department, the head of the sponsoring unit, or the coach).

Academic Integrity: Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are guilty of plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students guilty of, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.

Accessibility for students with disabilities: Students needing disability accommodation for this course should contact the Disability Resource Center as soon as possible. The DRC is located on the 4th floor of the Health Services Building, and can be reached by phone: 815-753-1303 (V) or e-mail: drc@niu.edu.

For a more detailed version of NIU's statements on Attendance, Academic Integrity, and Accessibility, see http://www.niu.edu/stat/courses/pdfs/Accessibility_Statement.pdf.

Syllabus Change Policy: Every effort has been made to ensure that the syllabus posted on the first day of class is as complete and accurate as possible. However, small changes can sometimes become necessary as the semester progresses. Every effort shall be made to keep any such change to the minimum and to notify students as early as possible. The most up-to-date version of the syllabus (this document) will be available in the *Information* section of the course web page on *Blackboard* throughout the semester.