

PHY 102: Atoms to Galaxies

Section Number: 09 (Lecture) and 10 (Lab), Spring Semester 2012

Instructor: Dr. Jay Ansher

Office: 312-E Moulton Hall (MLT)

Office hours: 9 AM-11 AM TUE and 2 PM-4 PM WED, or by appointment

E-mail: jansher@ilstu.edu

Office phone: (309) 438-5247 (on campus: 8-5247)

Class Web Page: <http://www.phy.ilstu.edu/~ansher/phy102.html>

Class meets: Room 210 MLT, 2:00-3:15 PM, each TUE and THU

Lab meets: Rooms 202 and 204 MLT (Computer Lab hours below)

Required Textbooks: The Cartoon Guide to Physics (Gonick and Huffman)

Discovering the Universe, 9th ed. (Comins and Kaufmann)

Required Lab Manual: Hands-On Activities For Physics 102 (Ansher and Goderya)

Required Materials: Turning Point Interactive Classroom Response Pad ("clicker")
After purchase, register on iCampus. (Info on class web page).

Recommended Materials: A cheap scientific calculator (with trig functions, exponents, etc.)

Catalog Course Description:

Concepts, history, and methodology of physical ideas such as motion, thermodynamics, electromagnetism, quanta, and relativity with interrelationships and applications.

General Course Structure:

Class: Each meeting time, there will be lectures, which will primarily cover the same subjects presented in the textbooks. The lectures will also include occasional supplemental videos, slide shows, demonstrations, internet presentations, and discussion of newspaper or magazine articles. There will be some electronic in-class exercises and reading quizzes, so reading the appropriate sections in the text **before** the lecture is strongly suggested, and will make the lectures much more meaningful. I may also arrange a "field trip" to the Planetarium next door in Felmley Hall for one lecture. As a courtesy to those around you, please do not bring cell phones, iPods, or other similar devices to class; at the very least, turn them off before class begins.

Lab: Lab Activities from the lab book must be completed during the week they are scheduled. There are **no make-ups**. They can be done anytime during the week when the computer lab is open. Lab hours are 9 AM - 4 PM on Tuesdays, Wednesdays, Thursdays, and Fridays. Lab worksheets should be turned in to the lab monitor on duty, in the correct tray for your section. After the grader finishes grading them, you may pick them up from the monitor in the lab room. Since lab hours are subject to availability of monitors, be sure to check the notice board outside of room 204 MLT for updates or changes.

Attendance and Participation:

We will cover a lot of material during each class period, and there is some material I will present that is not a part of the textbooks. It will be in your best interest to attend class regularly. Participation in class **will** count toward a small portion (5%) of your grade and will be recorded through in-class use of the Turning Point interactive response pads. If you miss class, you cannot make up the participation questions or reading quizzes and it will be **your responsibility** to get class notes from someone who did attend that day. Success in the class will be much more likely if you show up regularly and participate often. If you don't, the material will get difficult rather quickly. I will do my best to try and accommodate people who cannot attend due to emergencies or illness.

Grading:

Plagiarism or cheating in this course **will not** be tolerated. The first violation will result in a zero for that activity. The second violation will result in a failing grade for the course. Please review what behavior constitutes cheating in the ISU Code of Student Conduct:

<http://deanofstudents.illinoisstate.edu/students/get-help/crr/code-of-conduct.shtml>

There will be two in-class exams and one final exam for this course. There will also be semi-weekly homework assignments or quizzes (done online), random in-class reading quizzes and participation questions, and ten laboratory activities. The homework assignments and the labs will involve *some* mathematical calculations, but the exams will **not** require you to memorize formulas or do difficult calculations.

Exams: Each exam will use the OPSCAN forms and may consist of a combination of some **simple** math problems, multiple choice, true-false, matching, short answer, or fill in the blank. Exam questions will be similar to (and may be taken from) the homework/quiz questions as well as the reading quizzes and the in-class response pad questions. Exams will be closed book and notes. No iPods, cellphones or devices other than a calculator will be allowed during exams. There will be an optional study session and review before each exam, held outside of regular class time.

Final Exam: The final exam will be comprehensive. Half will cover new material presented after Exam #2, and half will cover material from the entire semester.

Homework: Homework will be assigned using a web-based quiz software package called *Mallard*, (<https://mallard.phy.ilstu.edu/phy102ansher>). The homework may consist of some math problems, short answer, multiple choice, and true/false questions. Some may be similar to questions in the textbooks but I will also assign many of my own questions. The online homework is graded automatically and you will be able to immediately learn the results. The *Mallard* server is secure, so you will be assigned a User ID and Password when the first assignment is made. Assignments will usually be made on Wednesdays and will usually be due the following Wednesday. I strongly encourage you to work together on homework problems. You can gain a lot of understanding by discussing the problems with other students in the class.

Class Participation: The in-class clicker questions will be part of most lectures. At the end of the semester, the 5% of your final grade that comes from participation will be assigned based on your clicker use and responses. Your participation score will be 3% whether you clicked in at all, and 2% whether you got the questions correct or not. You must attempt at least 3/4 of the clicker questions to get the full 3% for participation ($\frac{1}{2}$ - $\frac{3}{4}$ gets 2%, etc.).

Lab Activities: Each activity must be done in the computer lab rooms (MLT 202 and 204). You may do the activity at any time during the week when the lab is open. Each activity must be done by the time the computer lab closes on Friday afternoon, but you must turn in your worksheets before you leave. There will be a monitor in the computer lab at all times if you have problems or questions. You **MUST** bring your lab manual with you each time in order to do the labs. Detailed instructions for each lab are in the lab book, so **read each activity before** coming to the lab. Most activities are to be done individually, but for the several labs that utilize equipment and a computer interface, you may choose **ONE** other student to work with as a partner. At the end of the semester, you may drop one (your lowest) lab score.

Reading Quizzes: I will give random reading quizzes at the start of class in order to encourage people to show up on time to class, monitor attendance, and motivate people to read the material in the textbooks ahead of time. The reading quizzes will be brief, consisting of 3-5 multiple-choice questions, and will utilize the interactive response pads. You must bring the clickers to class with you each time. Reading quizzes may not be made up. At the end of the semester, you may drop one (your lowest) reading quiz score.

Extra Credit: I may make some small extra-credit activities available to you over the course of the semester. These activities may be used to boost your grade, or partially offset missing labs, quizzes, or homework. They **are not** a substitute for the actual graded work.

Missed Work: The best policy if you know you will have problems turning in work on time or missing an exam is to arrange something with me **BEFORE** the conflict (for example, dentist appointment, or ISU athletic competitions). In a class this size, I won't accept late work, except in the case of medical or family emergencies. Because of the difficulty in setting up lab equipment each week, the labs cannot be made up if you miss one. So don't miss one.

Final Grades: I do not assign letter grades to individual exams or assignments. Letter grades will only be assigned at the time of midterm progress reports (APA Grades), and at the end of the semester. Your overall course percentage will be weighted according to the following:

30% from the weekly homework (Mallard quizzes)	20% from the final exam
20% from the two midterm exams (10% each)	15% from the lab activities
10% from the random in-class reading quizzes	5% from participation

Checking Grades: You will be able to check all your homework, quiz, exam and lab scores, as well as progress throughout the semester, by logging into the Mallard system at any time. The final course grades will roughly follow a scale of: 90% and up-A, 80-90%-B, 70-80%-C, 60-70%-D, and below 60%-F. At the end of the semester, after determining the mean class score to assess what the "average" grade (C-level) *should be*, I may adjust the scale downward if needed. To calculate your course grade percentage, use the guide posted on the course web page.

Tentative Course Schedule:

This course schedule may be adjusted earlier or later, depending on progress throughout the semester. You will be told in class of any modifications. The accompanying sections in the textbooks are included *in italics* (CGP = Cartoon Guide to Physics, and DTU = Discovering the Universe) and should be read **before class** on the listed date.

Tuesday, January 17 and Thursday, January 19	Syllabus, Introduction <i>DTU Preface</i> What is (and is NOT) Science? <i>DTU 2-1</i> Introduction to Astronomy <i>DTU 1-1</i> No Lab this Week
Tuesday, January 24 Thursday, January 26	Math and Metric System Review <i>Appendix A and B</i> Light and the EM Spectrum <i>DTU 3-1 to 3-4</i> No Lab this Week
Tuesday, January 31 Thursday, February 2 Lab this Week	Atoms and Galaxies <i>DTU 4-5 to 4-6 and 16-1 to 16-6</i> Motion, Vectors, and Force <i>CGP Chapter 1</i> Activity A2-GA – “Graphical Analysis”
Tuesday, February 7 and Thursday, February 9 Lab this Week	Apparent Motions in the Sky <i>DTU 1-2 to 1-4</i> Modern Astronomy <i>DTU 1-5 to 1-7</i> Moon Phases and Eclipses <i>DTU 1-9 to 1-13</i> Activity A5-CI – “Computer Interface”
Monday, February 13 Tuesday, February 14	Optional Review Session for Exam #1 Planetarium Show (half of class) or An Early History of Astronomy <i>DTU 2-2 to 2-3</i> Galileo, Falling Motion <i>CGP Chapter 2</i>
Thursday, February 16	Exam #1 No Lab this Week
Tuesday, February 21	Planetarium Show (other half of class) or An Early History of Astronomy <i>DTU 2-2 to 2-3</i> Galileo, Falling Motion <i>CGP Chapter 2</i>
Thursday, February 23 Lab this Week	Planetary Motion, Kepler's and Newton's Laws <i>DTU 2-4 to 2-7</i> Activity A3-FF – “Free Fall”
Tuesday, February 28 and Thursday, March 1 Lab this Week	Gravitation and Kepler <i>DTU 2-8 to 2-9</i> Projectiles and Orbits <i>CGP Chapters 3, 4, and 5</i> Newton's 3 rd Law <i>CGP Chapter 6</i> Activity A4-PM – “Projectile Motion”
Tuesday, March 6 and Thursday, March 8 Lab this Week	Statics and Equilibrium <i>CGP Chapter 7</i> Impulse and Conservation of Momentum <i>CGP Chapter 8</i> Energy and Work <i>CGP Chapter 9</i> Activity A6-NSL – “Newton's Second Law”

March 13 and 15	No Class or Lab this Week (Spring Break) (Spring Semester Half Completed)
Tuesday, March 20 and Thursday, March 22 Lab this Week	Conservation of Energy, and Collisions <i>CGP Chapter 10</i> Electric Charge <i>CGP Chapter 12</i> Electric Fields <i>CGP Chapter 13</i> Activity A7-CE – “Conservation of Energy”
Tuesday, March 27 Wednesday, March 28 Thursday, March 29 No Lab this Week	Electric Current and Electric Circuits <i>CGP Chapters 14 and 15</i> Optional Review Session for Exam #2 Exam #2 No Lab this Week
Tuesday, April 3 and Thursday, April 5 Lab this Week	Magnetic Fields <i>CGP Chapters 17 and 18</i> Electromagnetism <i>CGP Chapter 19</i> Light Waves <i>CGP Chapter 23 and re-read DTU 3-4</i> Activity B3- CLE – “Coulomb’s Law of Electrostatics”
Tuesday, April 10 and Thursday, April 12 Lab this Week	Water and Sound Waves, and the Doppler Effect <i>DTU 4-7 to 4-8</i> The HR Diagram <i>DTU 11-1 to 11-13</i> The Lives of Stars <i>DTU 12-1 to 12-7</i> Activity B4- EOL – “Electricity and Ohm’s Law”
Tuesday, April 17 and Thursday, April 19 Lab this Week	The Death of Stars <i>DTU 13-1 to 13-18</i> Relativity & Black Holes <i>CGP Chapter 20 and DTU 14-1 to 14-12</i> Atoms, Radiation and Spectra <i>DTU 4-1 to 4-6</i> Activity C1-HRD – “H-R Diagram”
Tuesday, April 24 and Thursday, April 26 Lab this Week	Optics and Telescopes <i>DTU 3-5 to 3-17</i> Solar System Formation <i>DTU 5-1 to 5-10</i> Asteroids and Comets <i>DTU 9-1 to 9-14</i> Activity D1-LFA – “Light From Atoms”
Tuesday, May 1 and Thursday, May 3 No Lab this Week	The Sun and the Earth <i>DTU 10-1 to 10-7 and 6-1 to 6-4</i> Moon and Planets <i>DTU 6-5 to 6-10, 7-1 to 7-16, and 8-1 to 8-19</i> Cosmology and Astrobiology <i>DTU 18-1 to 18-5 and 19-1 to 19-6</i> No Lab this Week
Date and Time TBA	Optional Review Session for Final Exam
Wednesday, May 9	Final Exam 10:00 AM