Core Curriculum: CC105 Natural Sciences
The Evolution of the Physical Universe and of the Earth
Course Syllabus Fall 2012

OVERVIEW

CC 105 is the first-semester natural science course of the Core Curriculum, concentrating on the physical sciences. The Core Curriculum is a general education program that provides an overview of human knowledge and achievements in the humanities, natural sciences, and social sciences. Through the study of these subjects, students develop academic skills that will be of great use in the remainder of their formal education as well as in their lives beyond academia. In CC 105, we will explore the physical sciences (astronomy, physics, chemistry, and the earth sciences). Our main theme is the evolution of physical matter within the universe, "the story of stuff." Perhaps the greatest contribution that CC 105 will make to your life, however, will be less practical but no less important; you will gain a sense of how you personally, and humanity in general, fit into the universe.

The Core Curriculum explores fundamental intellectual issues from the points of view of the humanities, natural sciences, and social sciences. To promote this integration among disciplines, throughout CC 105 we will discuss the historical, philosophical, and theological implications of the scientific description of the universe.

CLASSROOMS AND MEETING TIMES: There are three main components to the course: the lectures, the discussions, and the laboratory exercises. You must attend all three components throughout the semester. The lectures are held twice per week, Tuesdays and Thursdays 2:00-3:30 in CAS 522, 725 Commonwealth Ave. The discussion sections meet for one hour each week in room CAS B6A, 725 Commonwealth Ave. The regularly scheduled labs meet biweekly according to the attached laboratory information sheet in SCI 307, Science Center, 590 - 596 Commonwealth Avenue.

MANDATORY EVENTS: In addition, there are two mandatory special events:

- THE GREAT FRUIT DROP: A reenactment of Galileo's apocryphal experiment at the Leaning Tower of Pisa on Sunday, September 9, 2:00 pm, CAS parking lot (behind Tsai Auditorium). This event will be combined with an ice cream social to welcome all Core students.

- PLANETARIUM SHOW: A special show just for BU students at the Boston Museum of Science. Shows will be held at sharply at 6:00 pm at the Planetarium. You can attend any one of three shows on Sept. 27, October 1, or October 2.

FRIDAY TUTORIALS: On Fridays there will be optional problem solving sessions, called the "Friday tutorials," for those who want extra help with the homework assignments. These will meet every Friday from 10:00 a.m. to 3:00 p.m., and you may drop in at any time. These tutorials are not required, but may be helpful for students who need to strengthen their problem solving skills. One of the benefits is the ability to work both with professors and your fellow classmates. The tutorials will be held every Friday from 10:00 to 12:00 in room SED 205 (School of Education, Main Entrance 2 Silber Way) and from 12:00 to 3:00 in the Psychology Building, 64 – 86 Cummington St., Room B36.

YOUR TEACHERS: The CC 105 course coordinator is Professor James Jackson. He, Professors Ulrich Faul, Alan Marscher, and Scott Whitaker, and Drs. Daniel Hudon and Mark Jonas will lead the discussion sections. All the professors will give lectures (see attached lecture schedule). The lab instructors will be Drs. Hudon and Jonas.

INTEGRATING FORUMS: In order to facilitate integration of the humanities with the natural sciences, the lecture series includes three "integrating forums" in which professors in the philosophy, theology, and natural science will participate. Each forum will leave ample time for discussion among both the faculty and the students.
COURSE SCHEDULE: The Lecture + Examination Schedule and the Laboratory Schedule are posted separately on this website and in the syllabus. These schedules are subject to change, in which case announcements will be made in class.

LOGISTICS

1. Professors (Lectures & Discussions)

James Jackson (Astronomy), CC 105 Course Coordinator; room CAS 115, 358-5462, email (preferred): 
jackson@bu.edu; office hours: Tuesday 12-2, or by appointment

Elizabeth Blanton (Astronomy), room CAS 5xx, room CAS 519, 353-2633, email eblanton@bu.edu, office hours TBA

Ulrich Faul (Earth Sciences), room CAS 113. 358-4341, email: ufaul@bu.edu, office hours: W, Th 11-12

Alan Marscher (Astronomy), room CAS 418, 353-5029, e-mail: marscher@bu.edu; office hours: M 10:30-11:30, Th 11:00 – 12:00.

Karl Ludwig (Physics), room SCI 450A, 353-9346, e-mail: ludwig@bu.edu; office hours: Th 3:30-4:30, F 8:45 – 9:45, or by appointment.

2. Instructors (Labs and Discussions)

Mark Jonas, Core Office (Room CAS 119), 358-2890, email: TBA; office hours Th 4:00 to 5:00

3. Core Curriculum Office: Prof. Malcolm Eckel, Director, (e-mail: mdeckel@bu.edu); Zachary Bos (e-mail: core@bu.edu), Administrative Coordinator; room CAS 119, 353-5404

4. Where to get help: For help with the course material, you should go to office hours. You may see any of the instructors (not just your discussion leader) during their office hours. For administrative assistance, please see either Mr. Bos in the Core Office for routine matters or Professors Jackson or Eckel for stickier problems. If you need to see one of the professors or instructors at any time other than during their office hours, simply e-mail or call them to set up an appointment. For help with math or homework, you should go to one of the Friday tutorial sessions, or to office hours.

5. Books, Laboratory Manual, and Clickers: You need to purchase the CC 105 textbook Physical Science 9th Edition (by Tillery). It is available at the bookstore, Barnes & Noble @ Boston University (Kenmore Square). You should read the pertinent chapters in the text before lecture (indicated on the lecture schedule). The text will be supplemented by occasional handouts, which will be posted on-line. The laboratory manual will be posted on-line. You will also be required to purchase a “clicker” for this course. We will use them for class participation exercises during lectures and also for attendance and pop quizzes. Clickers can be purchased at the bookstore.

6. Exams and Quizzes: There will be two in-class midterm exams (check the lecture schedule for the dates) plus a cumulative final exam, which will be given on Saturday, December 17 from 9:00 to 11:00 A.M. in the lecture room (Tsai). This date is set by the University and cannot be changed for individual students. You cannot reschedule the final for your personal convenience. If you purchase tickets for travel before December 17, you will be stuck with the cost. There will be quizzes in discussion sections based on material that you were assigned to read (mostly from the textbook) as well as on material that was covered at your previous or current discussion meeting. There will also be a few pop quizzes in lecture, held at the end of lecture, which will be
based on that day’s lecture.

7. Grading: Your final numerical grade will give the following weight to each of these components of the course: midterm exams 30% (15% each), final exam 25%, discussion section 25% (1/2 for weekly quizzes, and 1/2 for homework assignments; outstanding class participation can raise your discussion grade, while absences or lack of class participation will lower it), laboratory exercises 15%, and attendance and pop quizzes 5%. The labs are worth 15% of your grade and there are 5 labs, so each lab is worth 3% of your grade. Since the course carries CAS laboratory science credit, missing or failing (i.e., a grade of less than 50% of full credit) two or more lab exercises will result in an "F" grade for the entire course! In other words, if you fail the lab, you fail the course! The course will be graded on a curve, with an average grade in the B- range. [In past years, this has caused the division between a B- and C+ to be at a final average grade of about 80 out of 100.] The discussion grades tend to be a bit higher than the final average, and the exam grades a bit lower. The lowest two quiz grades (including those missed because of absences) and the lowest single homework grade will be dropped before computing your average grade.

8. Late Assignments: Homework assignments are due at the beginning of the discussion section. Lab assignments are due on the dates posted in the lab section of this syllabus. Since awarding credit to late work would be unfair to the students who hand their work in on time, we do not accept late work. For exceptional circumstances such as a prolonged illness or a family emergency, this policy can be overridden if you arrange the delayed submission in advance with your lab instructor for lab exercises, and your discussion instructor for homework.

9. Absences: You are expected to attend two lecture sections per week, one discussion section per week, one lab section every two weeks, the gravity demonstration on September 11, and the final exam. Because we care about each of you, you will be missed if absent! Also, since some of your grade will depend on your performance on quizzes and class participation in your discussion section, unexcused absences will affect your grade! In addition, for CAS students the Dean’s Office will be notified if you miss several classes without a valid excuse. Except in cases of personal illness or extraordinary personal problems, you are expected to attend all lectures, discussions, and labs. If you are or have been ill, or have some other emergency, you should contact your discussion leader or Prof. Jackson as soon as possible, preferably before you miss a class. You must make up all work missed because of an excused absence.

10. The CC 105 Web Page, blackboard.bu.edu: On the web page, you will find a number of useful items, including the outlines and most of the graphics shown in the lectures, homework assignments, labs, links to other informative sites of relevance to the course, and a math primer that will help you with mathematics, data, and algebra.

11. Academic Conduct: You need to read the University's Academic Conduct Code, which you can find on-line at http://www.bu.edu/academics/files/2011/08/AcademicConductCode.pdf. Academic misconduct involves not only direct cheating on tests, but some more subtle acts as well. All work handed in for credit must be your own, with the exception that you may quote or paraphrase from other sources if you also cite the reference and page number. (It is not permissible, however, to use another student's work even if you cite that work.) For assigned homework and lab write-ups, take care not to work so closely with a classmate that some of your results or answers to questions are nearly identical. I.e., your consultations with classmates should be limited to general discussions, not specific items such as “Show me how you answered question 2.” A good general rule is never to look at another student’s written work and never to allow another student to look at yours. If you need help, consult with one of the professors or lab instructors; if they are unavailable, send your question via e-mail. If you do not receive a response in time to complete the assignment by the due date, state so in another e-mail to them (with a copy to Prof. Jackson). We are required to report cases of suspected academic misconduct to the Dean's Office. Penalties for violations of the Academic Conduct Code may include suspension or expulsion from the University.
METHODS OF SCIENCE: MOTIONS

1. 9/4 Overview: why science matters (JJ) T Chapter 1
2. 9/6 The Copernican Revolution (JJ) (Ferris Chapters 1-4)
3. 9/11 Motions on the Earth (AM) T Chapters 2, 3, Handout 1
4. 9/13 Motions in the Sky (AM) T Chapters 2, 3, Handout 1
5. 9/18 Integrating Forum #1: Is the world deterministic?
6. 9/20 Waves (KL) T Chapter 5

STRUCTURE IN THE MICROWORLD: WAVES AND PARTICLES

7. 9/25 Light (EB) T Chapter 7
8. 9/27 Atoms (EB) T Chapter 8
9. 10/2 MIDTERM #1
10. 10/4 Nuclei and Radioactivity (KL)
11. 10/11 Quantum I: Wave/Particle Duality (JJ) Chapter 8
12. 10/16 Quantum II: Probability (JJ) Chapter 8
13. 10/18 Nuclei and Radioactivity (KL) Chapter 13
14. 10/23 The Periodic Table and Chemical Bonds (KL) Chapters 8&9
15. 10/25 Integrating Forum #2: The nature of reality

THE ORIGIN AND EVOLUTION OF THE COSMOS

16. 10/30 The Big Bang (EB) Chapter 14 + Handout 2
17. 11/1 Stars: Birth (AM) Chapter 14
18. 11/6 Stars: Death (AM) Chapter 14
19. 11/8 Origin of the solar System (AM) Chapter 15
20. 11/13 MIDTERM #2
21. 11/15 Early history of the Earth (UF) Chapter 15

THE ORIGIN AND EVOLUTION OF THE EARTH

22. 11/20 Plate Tectonics (UF) Chapters 18&19
23. 11/27 Earth’s Oceans (UF) Chapter 24
24. 11/29 Climate Change (UF) Chapter 22 & 23
25. 12/4 Integrating Forum #3: Must science be beautiful?
26. 12/6 Lecture X
27. 12/11 Science and Humanity in Perspective (JJ)

28. MONDAY 12/17 3:00 pm FINAL EXAM
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