COSMOS AND EARTH: MORSE ACADEMIC PROGRAM (MAP) NATURAL SCIENCE I

COURSE NUMBER: V55.0202.001  TERM: FALL 2002  CREDITS: 4

PROF. MARTIN I. HOFFERT,  
DEPT. OF PHYSICS, ROOM 525 MEYER  
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LECTURE ROOM: 121 MEYER  
TIME: MW 3:30 PM- 4:45 PM

TEACHING ASSISTANTS:

JAN LARSEN  
SANG-HYUK LEE  
BIN LIU  
WEIMIN ZHOU  

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E-MAIL: binn_liiu@hotmail.com  
E-MAIL: wz214@sciies.acf.nyu.edu

LECTURES AND LABS

<table>
<thead>
<tr>
<th>Class</th>
<th>SEC</th>
<th>DAY</th>
<th>TIME</th>
<th>ROOM</th>
<th>INSTRUCTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LECTURE</td>
<td>01</td>
<td>MW</td>
<td>3:30 PM - 4:45 PM</td>
<td>121 Meyer</td>
<td>Hoffert</td>
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<tr>
<td>LABORATORY</td>
<td>02</td>
<td>W</td>
<td>9:00 AM - 10:40 AM</td>
<td></td>
<td>Larsen</td>
</tr>
<tr>
<td>LABORATORY</td>
<td>03</td>
<td>W</td>
<td>11:00 AM - 12:40 PM</td>
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<td>Larsen</td>
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<tr>
<td>LABORATORY</td>
<td>04</td>
<td>W</td>
<td>1:00 PM - 2:40 PM</td>
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<td>Lee</td>
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<tr>
<td>LABORATORY</td>
<td>05</td>
<td>Th</td>
<td>9:00 AM - 10:40 AM</td>
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<td>Lee</td>
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<tr>
<td>LABORATORY</td>
<td>06</td>
<td>Th</td>
<td>11:00 AM - 12:40 PM</td>
<td></td>
<td>Liu</td>
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<tr>
<td>LABORATORY</td>
<td>07</td>
<td>Th</td>
<td>1:00 PM - 2:40 PM</td>
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<td>Zhou</td>
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<tr>
<td>LABORATORY</td>
<td>08</td>
<td>Th</td>
<td>3:00 PM - 4:40 PM</td>
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<td>Zhou</td>
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<tr>
<td>LABORATORY</td>
<td>09</td>
<td>Th</td>
<td>5:00 PM - 6:40 PM</td>
<td></td>
<td>Liu</td>
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NOTE: You must be registered for the lecture and one lab session to be registered for the course. PRE-REQUISITE: CAS: Quantitative Reasoning (or exemption from QR); Other schools: The math equivalent.

REQUIRED TEXTS:

STUDY GUIDES:
Study guides will be made available through a COSMOS AND EARTH Web site to be announced. The guides are intended to help students focus on key ideas and information that may appear on examinations. The texts provide supplementary information from a different point of view and background that can be helpful for the labs.
COURSE OBJECTIVES AND STRUCTURE:
We live at a unique time in history. Science, by the early 21st century, has created for the first time a coherent story of the creation and evolution of the Universe, from the first moments of the cosmic explosion that created the Universe to the appearance of human intelligence on the planet Earth. This story—essentially a scientific account of Genesis—should be a part of the intellectual foundation of all educated persons.

This course addresses some of the biggest questions in science—the origin and structure of the Universe, the formation of our Sun and planet, and the origin and evolution of Life. Part I focuses on the broad astronomical questions—the nature of stars and galaxies, the Big Bang, the origin of matter, the life history of stars, and the origin of planets. Part II focuses on the origin and geologic evolution of earth-like planets, the origin and history of the Earth, and the relevant factors in the evolution of life and intelligence in the Cosmos. This Fall 2002 semester both parts will be taught by Prof. Marty Hoffert, a physicist and earth system scientist in the Physics Department.

EXAMS AND GRADERS:
There will be two classroom exams: A Midterm (30%) and a Final (30%), both of which will consist of questions with multiple choice answers. The exams will cover material in lectures, labs and reading assignments as summarized in the study guides, and count 60% toward the final grade. To get credit for the course these exams MUST be taken when scheduled except under extraordinary circumstances. A student absent from either of these exams may be allowed a makeup exam only upon submitting a letter from a physician (in case of serious illness); or a clergy person or funeral director (in case of death of a close relative). In rare instances where a makeup exam is allowed, it may take a format different from
multiple choice at the discretion of the Professor. Lectures meet twice a week; Labs once a week. You must be registered for both Lecture and Lab to get course credit. Labs are a major part of the course. They count 40\% toward the final grade -- of which 10\% is from quizzes given by Lab TA's and 30\% from Lab Report grades. In all, there are 26 lectures and 12 Labs with experiments and/or demonstrations. No Lab the first week and the last week's Lab session is devoted to review.

MORE COSMOS PEOPLE:
(Morse Academic Program, Main Building, 100 Wash Square East, 9th floor)
Andre Adler (MAP/Lab coordinator)  Phone: 212-998-7802,  E-mail: andre.adler@nyu.edu
Rita Shiman (Enrollments)  Phone: 212-998-3807,  E-mail: rita.shiman@nyu.edu
Esther Nemethy (Lab, 204 MAIN)  Phone 212-998-3537,  E-mail: esther.nemethy@nyu.edu

WEEKLY LECTURE SYLLABUS:

<table>
<thead>
<tr>
<th>Lec</th>
<th>Date</th>
<th>Topics, Readings &amp; Lab</th>
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<tbody>
<tr>
<td>1</td>
<td>W 9/04</td>
<td>Introduction: Our place in the Universe and how we know it. How science asks questions. What answers technology makes possible. READ: SILK, CHAPTS 1 &amp; 2 NO LAB</td>
</tr>
<tr>
<td>2</td>
<td>M 9/09</td>
<td>&quot;The Big Bang&quot;: Part I: Overview from elementary particles to atoms, molecules, stars, galaxies and planets. READ: Study Guide #1: SILK, CHAP. 3</td>
</tr>
<tr>
<td>3</td>
<td>W 9/11</td>
<td>Entering Space: Observing the Cosmos. But, when do WE go? READ: Study Guide #1, SILK, CHAP. 4 LAB: &quot;Powers of Ten&quot; (video) and Math Review</td>
</tr>
<tr>
<td>M 9/16</td>
<td>(YOM KIPPUR) -- No class.</td>
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<tr>
<td>4</td>
<td>W 9/18</td>
<td>The physics of light I. Wavelength and spectra. The life cycle of stars: Why they turn on, shine, make elements, and sometimes explode. READ: Study Guide #2; SILK, CHAP. 5 LAB: Hubble's Law (ballon)</td>
</tr>
<tr>
<td>5</td>
<td>M 9/23</td>
<td>The physics of light II. When stars die: red giants, white dwarfs, neutron stars, black holes, &quot;wormholes&quot; and time travel. READ: Study Guide #2; SILK, CHAP. 6</td>
</tr>
<tr>
<td>6</td>
<td>W 9/25</td>
<td>Cosmology: The questions are old, but answers, today, come from physics. So how old is the universe, anyway? READ: Study Guide #3; SILK, CHAP. 8 LAB: Intro. to Spectra</td>
</tr>
</tbody>
</table>
7 M 9/30 The origin of matter and elements. What is "dark matter" & who needs it? What is SETI? READ: Study Guide #3; SILK, CHAPT. 12;

8 W 10/02 Physics of Light II & The Death of stars. READ: Study Guide #4; SILK, CHAPT. 14 LAB: Wavelength of light (Young's Experiment on Interference)

9 M 10/07 Where are the aliens? Extrasolar planets, yes. But Earthlike ones? We may know soon. READ: Study Guide #4; SILK, CHAPT 16

10 W 10/09 Exploring space by going there. Robotic solar system probes: Viking, Voyager and Galileo. What we learned. READ: Study Guide #5; SILK, CHAPT. 17 LAB: Spectroscopic analysis (Emission spectra)


12 W 10/16 Leaving home: Extraterrestrial resources, communications satellites, space power, emigration? READ: Study Guide #6 LAB: Red shift (Computer lab)

13 M 10/21 The Cosmic Connection: A human role in the universe? Is ours the only universe; and if not, can we access other ones? In the end, will we matter? READ: Study Guide #6; KUMP, CHAPT. 16 NO LAB

14 W 10/23 MIDTERM EXAM

PART II: The Earth

<table>
<thead>
<tr>
<th>Lec Date</th>
<th>Topics, Readings &amp; Lab</th>
</tr>
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<tbody>
<tr>
<td>15 M 10/28</td>
<td>Formation and early evolution of the Solar System. READ: Study Guide #7; KUMP, CHAPT. 1</td>
</tr>
<tr>
<td>18 W 11/06</td>
<td>The Earth: Composition and structure of the Earth. READ: Study Guide #8, KUMP, CHAPT. 4 LAB: The Goldilocks Problem</td>
</tr>
</tbody>
</table>
19 M 11/11 Rocket Science I: Newton and satellite orbits
READ: Study Guide #9, KUMP, CHAPT. 5

History of continental drift.
READ: Study Guide #9, KUMP, CHAPT. 6
LAB: Location of Earthquakes

21 M 11/18 Rocket Science II: Chemistry, Hardware and Future
READ: Study Guide #10, KUMP, CHAPT. 7

22 W 11/20 Evolution: How does it work, and what is the evidence?
READ: Study Guide #10: KUMP, CHAPT. 9
LAB: Evolution of Life (Museum Trip)

23 M 11/25 Atmospheres and Oceans.
READ: Study Guide #11, KUMP, CHAPT. 10

24 W 11/27 The early history of life: From cells to animals.
READ: Study Guide #11: KUMP, CHAPT 13
LAB: Fossils and Mass Extinction’s

25 M 12/02 Evolution of Humans and Intelligence.
READ: Study Guide #12: KUMP, CHAPT. 14

26 W 12/04 The Human Impact on the Biosphere
READ: Study Guide #12: KUMP, CHAPT. 15, RE-READ: KUMP, CH. 16
LAB: The Drake Equation and Life in the Universe.

27 M 12/09 Human origins and beyond. Explosive growth of the human brain. Intelligent
Life in the Universe?
READ: Study Guide "How many People Ever Lived?"
LAB: Review

M 12/18 FINAL EXAMINATION (4:00 PM to 5:50 PM)

Revised 8/18/02
Academic Guidelines for Students

To help foster common academic expectations among students and instructors, the following guidelines for MAP courses are offered to students. While these represent minimum expectations across the curriculum, individual faculty members may set additional course requirements. Students should therefore be sure to consult the course syllabus for details of policies in each class.

Attendance
Inasmuch as students have voluntarily sought admission to the University, they are expected to attend all class meetings, including all lectures and all meetings of associated recitation, workshop, or laboratory sections. Students may be excused for documented medical or personal emergency and will receive reasonable accommodation for the observance of religious holidays. In these cases, they should contact their instructors in advance or, in cases of emergency, as soon as is practicable. Students are responsible for making up any material or assignments they miss.

Classroom Decorum
The classroom is a space for free and open inquiry and for the critical evaluation of ideas, and it should be free of personal prejudice. Students and instructors alike have an obligation to all members of the class to create an educational atmosphere of mutual trust and respect in which differences of opinion can be subjected to deliberate and reasonable examination without animus.

As a matter of courtesy to their fellow students and instructors, students should arrive at class promptly, prepared and ready to participate. Students are reminded particularly to shut off all cellular telephones and pagers and, except in cases of emergency, to remain in the classroom for the duration of the lecture or section meeting. If it is necessary to leave or enter a room once class has begun, students should do so quietly and with as little disruption as possible.

Under University policy, disruptive classroom behavior may be subject to faculty review and disciplinary sanction.

Completion of Assignments
Students are expected to submit course work on time and to retain copies of their work until a final grade has been received for the course. Instructors are not obliged to accept late work and may assign a failing or reduced grade to such assignments.

Students who encounter sudden and incapacitating illness or other comparably grave circumstance that prevents them from completing the final examination or assignment in a course may request a temporary mark of Incomplete from the course instructor. To receive an Incomplete, students must have completed all other requirements for the course, including satisfactory attendance, and there must be a strong likelihood they will pass the course when all work is completed.

Questions and Concerns
Up-to-date course information is available on the MAP website, http://www.nyu.edu/cas/map. Questions, concerns, comments, and feedback may be directed to the following members of the MAP staff, both located in 903 Silver, (212) 998–8119. Complaints will remain confidential.

- Foundations of Contemporary Culture: Dr. Vincent Renzi  map.fcc@nyu.edu
- Foundations of Scientific Inquiry: Dr. Trace Jordan  map.fsi@nyu.edu
New York University • Morse Academic Plan

Statement on Academic Integrity

As a student at New York University, you have been admitted to a community of scholars who value free and open inquiry. Our work depends on honest assessment of ideas and their sources; and we expect you, as a member of our community, likewise to maintain the highest integrity in your academic work. Because of the central importance of these values to our intellectual life together, those who fail to maintain them will be subject to severe sanction, which may include dismissal from the University.

Plagiarism consists in presenting ideas and words without acknowledging their source and is an offense against academic integrity. Any of the following acts constitutes a crime of plagiarism.

- Using a phrase, sentence, or passage from another person’s work without quotation marks and attribution of the source.
- Paraphrasing words or ideas from another’s work without attribution.
- Reporting as your own research or knowledge any data or facts gathered or reported by another person.
- Submitting in your own name papers or reports completed by another.
- Submitting your own original work toward requirements in more than one class without the prior permission of the instructors.

Other offenses against academic integrity include the following.

- Collaborating with other students on assignments without the express permission of the instructor.
- Giving your work to another student to submit as his or her own.
- Copying answers from other students during examinations.
- Using notes or other sources to answer exam questions without the instructor’s permission.
- Secreting or destroying library or reference materials.
- Submitting as your own work a paper or results of research that you have purchased from a commercial firm or another person.

Particular emphasis is placed on the use of papers and other materials to be found on the World-Wide Web, whether purchased or freely available. In addition to having access to the same search engines as students, faculty also have at their disposal a number of special websites devoted to detecting plagiarism from the web.

Plagiarism and other cases of academic fraud are matters of fact, not intention. It is therefore crucial that you be diligent in assuring the integrity of your work.

- Use quotation marks to set off words not your own.
- Learn to use proper forms of attribution for source materials.
- Do your own original work in each class, without collaboration, unless otherwise instructed.
- Don’t use published sources, the work of others, or material from the web without attribution.
- Ask your professor or preceptor if you have questions about an assignment or the use of sources.
- For further information, consult the Bulletin of the College of Arts and Science, the CAS Academic Handbook, and the Student’s Guide to NYU.