Spring 2004  
Meyer 121

Tuesday and Thursday  
12:30 a.m. – 1:45 p.m.

Professor Georgi Dvali  
Department of Physics  
4 Washington Place, Room 505  
Phone: (212)-9928785  
E-mail: gd23@nyu.edu  
Office hours: Thursday 11:00 a.m.-12:00 a.m.

Laboratory Instructors:

Francesco Nitti,  
Yanwen Shang,  
Weimin Zhou

Department of Physics  
4 Washington Place
1. Is the Universe infinite or finite? Did the Universe have a beginning?
2. What is the nature of space and time?
3. Is space and time affected by motion? Is space and time affected by gravity?
4. What is light? Is light a wave or a particle?
5. How do we know that atoms exist?

These questions were the subject of the work of Albert Einstein. In this course we shall address ourselves to understand Einstein’s answers to these questions. Einstein’s ideas that time is affected by motion (special theory of relativity) and gravity (general theory of relativity) form a major part of the course. We start by considering the nature of light to show how it led Einstein to his theories of relativity and his seminal contributions to the quantum theory. The course will consist of lectures, laboratory projects and homework problems. Both homework and labs are excellent preparation for all examinations. Homework assignments will be announced in class. The homework will be collected and checked to see if everyone is keeping pace with the work, but they will not be graded. There will be two in-class exams and a cumulative final exam. It is important to bring a calculator and course textbooks to the laboratory sessions. You will also need to bring a calculator to all exams.

The course is divided up into three sections:
6. Nature of light: Young’s experiment (wave) and the Photoelectric effect (particle); Wave-particle duality.
7. Special theory of relativity: motion’s affect on time; E = mc².
8. General theory of relativity: gravity’s affect on time, and curved space; The Big Bang and quarks: the very big meets the very small.

Course texts
9. *Newton to Einstein: The Trail of Light*, by Ralph Baierlein
10. *Relativity and Its Roots*, by Banesh Hoffmann
11. *The Elegant Univers*, by Brian Greene
12. *Einstein’s Universe Laboratory Manual*

These books are available at the NYU Bookstore and one copy of each is on reserve at Bobst Library.

Course Grade
First midterm examination: 25%
Laboratory: 35%
Final examination: 40%
Laboratory Sessions
These weekly sessions are an important part of the course. You will have to submit a lab report documenting your experiment, observations, data and conclusions. The lab report should contain an introduction that describes the principle or principles that the experiment is designed to demonstrate, followed by a description of the experiment. The lab report will be due in lab one week after the experiment has been performed. Questions about the experiments will appear on examinations. The laboratory sessions will be held in Main 203. Laboratory sessions meet at the following days and times:

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<td>Nitti</td>
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<td>Nitti</td>
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Each laboratory session will have a grade of 50 points associated with it. These will be distributed as follows.

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<tr>
<td>Lab report</td>
<td>30 points</td>
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<td>Lab quiz</td>
<td>10 points</td>
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<td>Attendance</td>
<td>10 points</td>
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<td>Total points</td>
<td>50 points</td>
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Course Policies

Midterm Exams
If you will miss a midterm exam because of illness, you must contact Prof. Dvali by phone or e-mail before the start of the exam and follow up with a doctor's note.

Final Exam
The same notification policy applies for the final exam. However, in this case you will be assigned an incomplete for the course and will be expected to schedule a make-up final exam for the beginning of the next semester.

Laboratory Sessions
If you miss a lab session because of illness, you must notify the teaching assistant by phone or e-mail before the lab session and obtain a doctor's note explaining the reason for your absence. Failure to follow these procedures will result in a grade of F for the lab project. Work that is submitted past the due date without a valid reason will result in a lowered grade. You will be expected to arrive punctually for the beginning of the lab session, and arriving more than 15 minutes late will result in a loss of attendance credit for that session.

Religious Holidays
If you will be absent for a religious holiday during the semester, you must contact Prof. Dvali and your laboratory instructor in advance and re-schedule your attendance at the lab. You will be at a serious disadvantage in the course if you are not able to complete all of the laboratory assignments.
Missed Exams

There are no make-up exams for this course. If you miss all in-class examination, for a valid reason (illness, injury or family emergency), your grade will be based on the following allocations:

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<tr>
<td>Laboratory</td>
<td>35%</td>
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<tr>
<td>Final examination (cumulative)</td>
<td>65%</td>
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Final Exam

A make-up for the final examination will be given under exceptional circumstances, which must be discussed with Prof. Dvali before the examination. In this case a grade of incomplete will be assigned and the make-up will be scheduled for the Fall 2004 semester. Please avoid making travel plans before the date of the final exam. No alternative date for the final examination will be offered before the 2004 semester.