Syllabus

Instructor: Dr. Balraj Menon
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Lecture: MWF 2:00 pm - 2:50 pm, LSC 110

Office hours

- MWF 11:00 am - 12:30 pm AND by appointment.
- Feel free to stop by my office at any other time. If I am available and not occupied with anything else I will be glad to help you with your questions.

Prerequisites

PHYS1441, PHYS1442, PHYS2443 OR MATH1591, MATH1592, MATH2371.
If you do not satisfy these prerequisites please contact me during the first week of classes.

Required text

Introducing Einstein's Relativity, Ray d'Inverno. Publisher: Oxford University Press.

Web access

- All documents pertaining to this course are available on WebCT (http://ce2.uca.edu:8900).
- You need to login to WebCT and add this course. Logging instructions can be found at http://www.uca.edu/aoep/webct.htm.
- The course is listed as *Topics in Theoretical Physics (Menon MWF)*.

Course description & organization

The main objective of this three credit hour course is to provide a concise introduction to Einstein's general theory of relativity that describes the gravitational field and motion in a gravitational field. Listed below is a (tentative) list of topics that we plan to cover in this course. The chapters listed below refer to the text.

1. A brief review of special relativity (Chapters 2, 3, 4).
2. Tensor algebra & tensor calculus (Chapters 5, 6, 7)
3. The field equations of general relativity (Chapters 8, 9, 10, 12).
4. Exact solutions of general relativity (Chapters 14, 16).
5. Experimental tests of general relativity (Chapter 15).
6. Cosmology (Chapters 22, 23).

Lectures

- The lectures will be devoted to discussing the various mathematical and physical concepts encountered in the text. For the most part, the lecture presentation will closely follow the text. To get the most out of these lectures, I will strongly advise you to read the relevant sections in the text prior to attending the lectures.
- You are required to attend *all* lectures, You must be on time and actively participate in all the class discussions. Excessive absence in the lectures will result in the student being dropped from the course for poor attendance.

Homework

- The key to understanding general relativity is to work through as many problems as possible. At the end of each chapter in the text is a selection of problems that tests your understanding of the material covered in that chapter.
- At regular intervals, several of these problems will be assigned as homework problems that you must submit by a specific date. The homework problems will be posted on WebCT along with their due dates.
- Some of the homework problems will require you to use the software package *Maple*. This package is available on machines in the Mathematics department and will be made available in the Unix lab (LSC 175). If you have any questions about accessing the software or working with it, please come and see me.
- Do not restrict yourself to the assigned problems. Try to attempt as many problems as you can. If you need assistance, feel free to stop by my office or collaborate with other students.
- **Late assignments will be accepted, but *five* points will be deducted for each day past the due date of submission**.

Exams

- You will be taking about 2-3 tests during the semester. These tests could include an in-class component and a take-home component. There will also be a Final Exam at the end of the semester.
- **The Final Exam is scheduled for Friday, May 6, 2005, from 10:00 am - 12:00 pm in LSC 110**.

Class report & presentation

- Each student will be required to investigate a specific topic in general relativity not covered in class, prepare and submit a 6-10 page typed report and make a 15 minute class presentation at the end of the semester.
- The topic you wish to investigate must be approved by me. I will provide you with a list of recommended topics in the next couple of weeks. If there is a specific topic that you would like to research, please come and discuss it with me.
- More details about the report and the presentation will be provided later.

Course grade

Your grade in this course will be based on your participation in the lectures, the homework assignments, tests, the class report & presentation and the final exam. The various components are weighted as follows:

Homework and class participation:	30%
Tests:	30%
Class report and presentation:	25%
Final exam:	15%

The percentage points required for each grade letter is:

$\geq 90\%$	A	80%–89%	B	70%–79%	C	60%–69%	D	$< 60\%$	F

Academic integrity:

Plagiarism, copying from others on tests, use of unauthorized materials on tests and quizzes (cheat sheets, electronic devices with text-messaging capabilities such as computers, cell phones etc.) or any other form of academic misconduct is strictly prohibited.

- Penalties for academic misconduct are described in the UCA Student Handbook-2004–2005.
- Penalties range from grade reduction to expulsion from UCA.

University policies

Students are expected to be familiar with the general policies of the University and are encouraged to read the UCA Student Handbook-2004–2005. Pay particular attention to the following policies:

1. Academic Policies (starting on Page 34 of the UCA Student Handbook-2004–2005)
2. Sexual Harassment Policy (Pages 109-111 of the UCA Student Handbook-2004–2005)

Americans with disabilities

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Office of Disability Services, 450 3135. In addition, please make every attempt to meet with me during the first week of classes to make suitable arrangements.