

# PHY 490 - Introduction to Cosmology

Syllabus

Dr. R.L. Herman

Fall 2010

**Instructor: Dr. R. Herman**  
**Office Hours: MF 9:30-11:30 AM**  
**TR 9:30-10:30 AM**  
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*Our views of the universe have changed a lot in the past century, and in the last decade. It is now believed that the universe is expanding and that we only know a fraction of it while we begin the search for dark matter and dark energy. If ones runs the history of the universe backwards, what do we find? What was the universe like in the first three minutes? How does one do useful science for a time in which nobody existed? How did our view of the universe get to this point and where are we headed in the next decade?*

## Course Content:

**Required Texts:** *Introduction to Cosmology*, Barbara Ryden, Addison-Wesley, 2003; *The First Three Minutes*, S. Weinberg, *An Exposition on Inflationary Cosmology*, S. Watson's Honor Thesis, UNCW.

### Course Description:

In this course we will study the origin and general structure of the physical universe. We will be lead into curved spacetimes, general relativity, black holes, and topics from the big bang to gravitational waves, gravitational lensing, and cosmological models of the universe.

We will cover the topics in chapters 2-12 of the main text, though the coverage will not be in quite as much detail in some of the latter chapters, depending how the course goes. Additional resources will be posted or linked to the course web site: [people.uncw.edu/hermanr/cosmos](http://people.uncw.edu/hermanr/cosmos).

The topics covered will include relatively current ideas about the large scale structure and evolution of the universe from the so-called *Big Bang* model to the acceleration of the expanding universe. A knowledge of general relativity is not assumed. We will learn enough to be able to talk about black holes and the underlying spacetime of the universe as given by the Robertson-Walker metric. We will look at the predicted and measured values of the cosmological parameters and then delve

into some of the physics of dark matter detection, fluctuations in the cosmic microwave background, and theories about the early universe.



## Course Requirements:

**Participation/Attendance:** You are expected to attend every class and to contribute to the class based upon your reading. After three excused absences, there will be a penalty of 2% for each absence from your total grade.

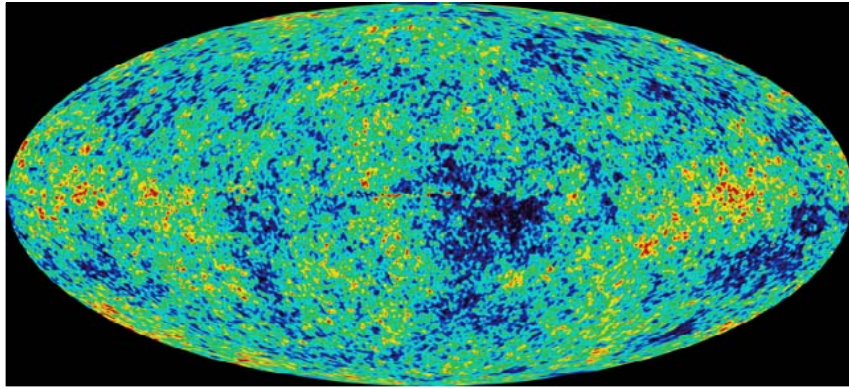
**Homework:** Homework assignments will be collected on a regular basis and you will be told when the work is due. As doing homework is very important for learning the material in this course, it will count as 30% of your grade.

**Papers:** You will do an in depth exploration into a topic not covered in class. This will result in a written paper and will count 10% of your grade.

**Exams and Grades:** There will be two exams and a final for this course. The exams will cover the basic material up to the date of the exam. The tentative dates for the exams are below.

Exams	Chapters	Date
Exam I	2-4	Sep 20
Exam II	5-9	Oct 29
Final	Cumulative	Dec 3, 11:30 AM

Your final grade will be based on the following:



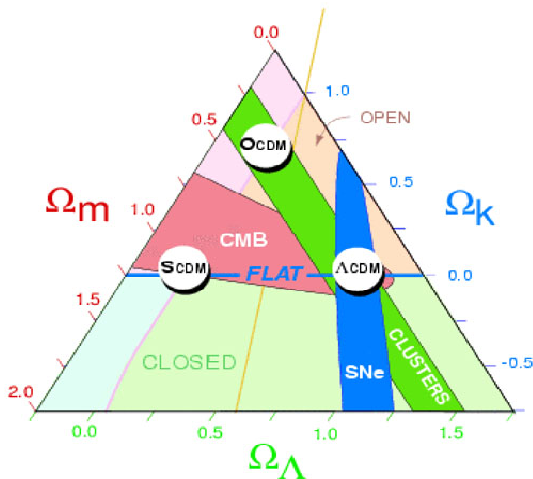
Homework	30%
Papers	10%
Exams	40%
Final	20%

90-100	A
80-89.5	B
70-79.5	C
60-69.5	D

Plus-minus grading may be used in special cases.

This syllabus is subject to change!

**Academic Honor Code:** All members of UNCW's community are expected to follow the academic Honor Code. Please read the UNCW Honor Code carefully (as covered in the UNCW Student Handbook). Academic dishonesty in any form will not be tolerated in this class. Please be especially familiar with UNC-W's position on plagiarism as outlined in the UNCW Student Handbook. Plagiarism is a form of academic dishonesty in which you take someone else's ideas and represent them as your own.



**Student Disabilities:** UNCW Disability Services supplies information about disability law, documentation procedures and accommodations that can be found at <http://www.uncw.edu/stuaff/disability/>. To obtain accommodations the student should first contact Disability Services and present their documentation to the coordinator for review and verification.

**Campus Respect Compact.** UNCW has recently instituted a Respect Compact to affirm our commitment to a civil community, characterized by mutual respect. That Compact will soon be affixed to the wall of each classroom and can be accessed at:

<http://www.uncw.edu/stuaff/pdc/documents/SeahawkRespectCompact.pdf>

### Other Cosmology Books

*Introduction to Cosmology*, M. Roos  
*Cosmological Physics*, Peacock  
*Principles of Physical Cosmology*, P.J.E. Peebles  
*An Introduction to Modern Cosmology*, A. Liddle  
*Cosmology*, S. Weinberg - Advanced

### Popular Books

*A Brief History of Time*, S. Hawking  
*A Briefer History of Time*, S. Hawking and L. Mlodinow  
*The Black Hole War*, L. Susskind  
*The Day We Found the Universe*, M. Bartusiak  
*Many Worlds in One*, A. Vilenkin  
*Endless Universe: Beyond the Big Bang*, P. J. Steinhardt and N. Turok  
*Big Bang: The Origin of the Universe (P.S.)*, S. Singh  
*Dark Side of the Universe: Dark Matter, Dark Energy, and the Fate of the Cosmos*, I. Nicolson  
*The Elegant Universe or The Fabric of the Cosmos*, B. Greene  
*Parallel Worlds: A Journey Through Creation, Higher Dimensions, and the Future of the Cosmos*, M. Kaku  
*Warped Passages: Unraveling the Mysteries of the Universe's Hidden Dimensions*, L. Randall