Syllabus - General Relativity Seminar - Spring 2011

Details

Meets Thursdays, 1:15-4:15 PM

Science Center, Room 163 - Chemistry Seminar Room

Professor John Boccio, Science Center 127, x-8259

Textbook

Relativity, Gravitation and Cosmology - Ta-Pei Cheng
Oxford University Press - Second Edition
ISBN 978-0-19-957364-6

Other Lecture Note References - On Website

Amanda Peet GR Lectures (Fantastic)

AS500 Lectures GR

GR Notes - Carroll (Complete)

GR Notes - No Nonsense - Carroll (Fantastic)

GR Notes - Blau (Complete)

MIT GR Lectures 1(Tensors)

MIT GR Lectures 2

Lectures on Tensors - Physics 50 - Boccio

BlackHoles - Luminet (Fantastic)

BlackHoles - Townsend (Complete)

Cosmology Lectures

Inflationary Cosmology (Fantastic)

Dark Energy - Straumann (Fantastic)

Other Textbook References - On Table in Boccio Office

General Relativity - Adler, Bazin and Schiffer

Cosmology and Gravitation - Berry

The Geometry of Spacetime - Callahan

Spacetime and Geometry - Carroll

General Relativistic Dynamics - Cooperstock

General Relativity - D'Inverno

General Relativity - Foster and Nightingale

Gravity - Hartle

General Relativity - Hobson, Efstathiou and Lasenby

General Relativity - Kenyon

General Relativity - Ludvigsen

Gravitation and Spacetime - Ohanian

Black Holes - Raine and Thomas

General Relativity - Ryder

Black Holes - Taylor and Wheeler

General Relativity - Walecka

Special Relativity - Woodhouse

General Relativity - Woodhouse

Website

http://chaos.swarthmore.edu/courses/Physics130_2011/index.html

Schedule

Week #01

Readings: Cheng: Chapters 1, 2
Topics

1. Overview
2. Special Relativity: The Basics

Week #02

Readings: Cheng: Chapters 3, 12
Topics

1. Special Relativity: The Geometric Formulation
2. Tensors in Special Relativity

Week #03

Readings: Cheng: Chapters 4, 5
Topics

1. The Principle of Equivalence
2. Metric Description of Curved Space

Week #04

Readings: Chapter 13
Topics

1. Tensors in General Relativity

Week #05

Readings: Cheng: Chapters 6, 14
Topics

1. GR as a Geometric Theory - I
2. GR as a Geometric Theory - II

Week #06

Readings: Cheng: Chapter 7
Topics

1. Spherically Symmetric Spacetime - GR Tests

Week #07

Readings: Cheng: Chapter 15
Topics

1. Linearized Theory - Gravitational Waves

Week #08

Readings: Cheng: Chapter 8
Topics

1. Black Holes - Part I

Week #09

Readings: Cheng: Chapter 8
Topics

1. Black Holes - Part II

Week #10

Readings: Cheng: Chapter 9
Topics

1. The Homogeneous and Isotropic Universe

Week #11

Readings: Cheng: Chapter 10
Topics

1. The Expanding Universe and Thermal Relics

Week #12

Readings: Cheng: Chapter 11
Topics

1. Inflation and the Accelerating Universe

Weeks #13 and #14

Readings: Moffat - $Re\ in\sqrt{en}\ +\ ing\ g\ rA\sqrt{ity}$
Papers by J.A. Moffat (see list below)

(1979) New Theory of Gravitation
(1979) Static Spherically Symmetric Solution
(1979) Cosmological Solution
(1987) Test-Particle Motion
(1994) Nonsymmetric Gravitational Theory
(1994) Conservation Laws in Nonsymmetric Gravitational Theory
(1995) Geodesic and Path Motion
(1997) A Self-Organized Critical Universe
(2004) Alternative to Dark Energy and Dark Matter
(2004) Galaxy Rotation Curves

(2005) Galaxy Rotation Curves Without Non-Baryonic Dark Matter
(2005) CMBR, Accelerating Universe and Inhomogeneous Cosmology
(2005) Inhomogeneities, Inflation, Acceleration - No Dark Energy
(2005) Scalar-Tensor-Vector Gravity Theory
(2005) Galaxy Cluster Masses Without Non-Baryonic Dark Matter
(2006) Modified Gravity - Solar System, Astrophysics and Cosmology
(2007) Non-Singular Cosmology in Modified Gravity
(2007) The Bullet Cluster shows Modified Gravity
(2008) Globular Cluster Velocity Dispersions in Modified Gravity
(2008) The Bending of Light and Lensing in Modified Gravity
(2008) Testing Modified Gravity with Motion of Galaxy Satellites
(2008) Cosmology without Dark Matter or Cosmological Constant

Topics

1. Moffat Non-Symmetric Gravity - Alternative to Einstein