

PHY 780 – General Relativity
 Tuesday and Thursday, 9:00-9:50, Olin 306

Instructor: Eric Carlson Office Hours
Office: 306 Olin Physical Laboratory MWF 10:45 – 11:45, TR 10:00 – 12:00,
My Web: <http://users.wfu.edu/ecarlson> or any time by appointment
Class Web: <http://users.wfu.edu/ecarlson/gr/index.html>
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Text: *Spacetime and Geometry, An Introduction to General Relativity* by Sean M. Carroll

Description: This course is an introduction to Einstein’s General Theory of Relativity

Materials: A scientific calculator, and a symbolic manipulation program, like *Maple*.

Homework: There will be homework assignments almost every day, assigned one week in advance. You are expected to turn in your homework at 9 AM on class days. There are ample opportunities to get help on the homework, so you should pretty much get them all correct.

Class Attendance: You are expected to attend class every day. If you have any communicable disease, you are encouraged to contact Dr. Carlson, and he will make arrangements to conduct the class virtually. If you have any other conflict, please contact Dr. Carlson in advance and he will make arrangements.

Grading: The grading will be based primarily on homework, with a small amount of class participation. I anticipate that most people in this class will get A’s or B’s. If you are getting C’s on homework, you probably are confused and will get more confused, and it’s time to get some help. If you are getting B’s, you probably are understanding most of the material, though you may be having some difficulty. If you are getting A’s, you are understanding a lot and are working hard.

Grading Breakdown

Homework: 90%
 Class Part: 10%

Grading Scale

94% A 80% B-
 90% A- 77% C+
 83% B 70% C

Web: This class’s website is <http://users.wfu.edu/ecarlson/gr/index.html>. You can find homework sets there together with solutions and some other materials, such as this syllabus.

Tentative Schedule:

August	23 25	Special relativity, tensors, vectors, dual vectors
Aug/Sept	30 1	Maxwell’s equations, momentum, energy
September	6 -	Tensors and the metric (class cancelled on Sept. 8)
September	13 15	Tensor densities, differential forms, covariant derivatives, geodesics
September	20 22	The Riemann tensor, symmetries, Killing vectors
September	27 29	Einstein’s equations, Lagrangian formulation, properties
October	4 6	Alternative theories, the Schwarzschild metric
October	11	Geodesics of Schwarzschild {fall break}
October	18 20	Extending Schwarzschild, black holes
October	25 27	review, linearized gravity
November	1 3	Gravity waves
November	8 10	Cosmology, the FLRW universe
November	15 17	Gravitational lensing, our universe

November 22 To Be Announced {Thanksgiving break}
Nov/Dec 29 1 To Be Announced