Physics 610
Syllabus

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Office: 2018 NCPA
Office hours: Anytime I am in, mornings are best.

Text: *Theoretical Mechanics of Particles and Continua,* by Fetter and Walecka

Grading

3	Tests
2	Homework and Pop Tests
2	Final
7	

12.5% per letter grade

Academic Regulations:

Please come to class on time. Attendance is required. Read ahead, start homework early so that you can turn it in on time. Review notes regularly. Mastery is not achieved overnight.

!!This syllabus is subject to change to accommodate instruction and or student needs!!

I will be attending a meeting 22 and 23 Feb and may miss class. We will adjust the schedule at that time.

Goal:

To develop an understanding of Classical Mechanics of Continua and to develop your math skills as applied to physics. Although we limit our study to mechanical systems, the mathematical methods carry over to quantum field theory, electromagnetism and gravitation.

Chapter 4: Normal modes in continua, field theory
Chapter 7: Strings - actually all of field theory with a practical example
Chapter 9: Sound waves - idealized application of field theory. Pressure in wave equations.
Chapter 11: Heat equation solutions - Laplace and Fourier solutions of the diffusion equation.
Chapter 12: Viscous loses in fluids - application to sound.
Chapter 13: Elasticity - physics of elastic solid media.

Expectations:

You are expected to read the text material before class and after class. It is expected that you will be able to reproduce any derivation presented on tests and the exam. I highly recommend that you take notes in class and annotate or recopy these notes after class so that you can use these notes to study. The problems in this course are similar to and often derived from research problems. Solving these will develop your ability to do independent research. Some of the homework problems are difficult. You should start working on the problems early so that if you need to read other texts or go to the library you will have time to do so.

Jan 16	Normal modes, many degrees of freedom (24)	
Jan 18	Many degrees (24), Discrete to continuous(25)	
Jan 23	Lagrangian for string(25) **Strings** (38)	Solutions to final turned in
Jan 25	Field theory (38), D'Alembert's solution (39)	
Jan 31	D'Alembert vs. Bernoulli (39), Eigenfunctions (40)	
Feb 1	Variational principle (41)	
Feb 6	Variational principle (41) Rayleigh-Ritz Method (42)	Probs 4.11, 4.14, 4.17
Feb 8	Rayleigh-Ritz Method (42)	
Feb 13	Green's functions (43	
Feb 15	**Test I, Chapters 1- 6**	**Test I**
Feb 20	Perturbation theory (44), Energy flux (45)	
Feb 22	Energy flux (45)	
Feb 27	**Sound waves,** Hydrodynamic eqs, Force, continuity (48)	
Mar 1	Hydrodynamic eqs , Euler's, energy, Bernoulli's (48)	
Mar 6	Thompson's theorem, Lagrangian (48), Sound (49)	Probs 7.1, 7.4, 7.5
Mar 8	Standing waves (49), **Heat**, heat basics (57)	
Mar 13-15	**Spring Break**	
Mar 20	Heat boundary cond. (57), Examples, separation of..(58)	Probs 7.11, 7.13, 7.17
Mar 22	Examples, Fourier and Laplace transforms (58)	
Mar 27	**Test 2, Chapters 1-7**	
Mar 29	Laplace examples, long and short time (59)	Probs 9.3, 9.4, 9.5
April 3	**Viscous fluids** Stress tensor (60)	
April 5	Stress tensor, Energy (60)	
April 10	Incompressible flow (61), Sound with viscosity (62)	Probs 11.1, 11.5, 11.11a, b, 11.13a
April 12	Sound (62), Elastic continua (63)	
April 17	Stress tensor, Energy (63)	
April 19	**Test 3, Chapters 1-7, 9, 11**	**Test 3**
April 24	Energy (62), Dynamical behavior (64)	
April 26	Dynamical behavior (64)	Probs 12.3, 12.9a,b, 12.13
May 1	Review/questions/make up	
May 3	Review/discussion/make up	Probs 13.2a, 13.4, 13.8
May 7-11	Final exam	