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PHSX 311.01: Oscillations and Waves

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PHYSICS 311 – OSCILLATIONS AND WAVES

Semester 2018

Autumn

LECTURES

Tue. & Thu. 11:00 – 11:50 a.m., CHCB 231

INSTRUCTOR

Eijiro ('Ebo') Uchimoto

Office: CHCB 127 (Tel. No. 243-6223)

Email: eijiro.uchimoto@umontana.edu

Office Hours: Mon. 10 – 11 a.m., Tue. 2 – 3 p.m., Wed. 3 – 4 p.m., Thu. 1 – 2 p.m.,
Fri. 11 a.m. – 12 noon (and by appointment)

SCOPE

- Development of physical intuition and mathematical skills necessary for analyzing a wide range of periodic phenomena
- Detailed studies of oscillations and waves in preparation for advanced study in physics

OUTCOME

- Will have acquired thorough and coherent understanding of periodic phenomena for a wide range of physical situations
- Will have acquired basic mathematical skills of solving ordinary and partial differential equations for oscillations and waves
- Will have acquired solid physical and mathematical foundations for advanced study in classical mechanics, electrodynamics, quantum mechanics, and optics

NUMBER OF CREDITS

2 credits

PREREQUISITES

Fundamentals of Physics (with Calculus) I and II or College Physics I and II

PRE/COREQUISITE

Multivariable Calculus (Calculus III)

TEXTBOOK

None. My personal manuscripts will be posted on Moodle.

HOMEWORK

Reading assignments and problem sets to be posted on Moodle.

EXAMS

Three midterm exams (Thu. 9/20, Tue. 10/23, Thu. 11/29)

Final exam (10:10 a.m. – 12:10 p.m. on Fri. 12/14)

COURSE GUIDELINES AND POLICIES

Student Conduct Code

The Student Conduct Code at the University of Montana embodies and promotes honesty, integrity, accountability, rights, and responsibilities associated with constructive citizenship in our academic community. This Code describes expected standards of behavior for all students, including academic conduct and general conduct, and it outlines students' rights, responsibilities, and the campus processes for adjudicating alleged violations. [Full student conduct code.](http://www.umt.edu/vpsa/policies/student_conduct.php)
http://www.umt.edu/vpsa/policies/student_conduct.php

Course Withdrawal

Students may use Cyberbear to drop courses through the first 15 instructional days of the semester. Beginning the 16th instructional day of the semester through the 45th instructional day, students use paper forms to drop, add and make changes of section, grading option or credit. PHSX 311 may not be taken as credit/no-credit.

Disability Modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students](#). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Grading Policy

Your grade will be based on the following:

Problem sets:	25%
Midterm exams:	45% (15% each)
Final exam:	30%

Typical cutoffs for the final course grade:

A-/B+	83%
B-/C+	72%
C-/D+	58%
D-/F	45%

TENTATIVE COURSE OUTLINE

Date	Topics
Week 1: Aug 28, 30	Introduction Simple harmonic motion (SHM) Addition of sinusoidal functions
Week 2: Sept 4, 6	Complex numbers Linear ordinary equations (ODE's) with constant coefficients
Week 3: Sept 11, 13	Pendulums Damped oscillators
Week 4: Sept 18	More on damped oscillators
Sept 20	Exam #1
Week 5: Sept 25, 27	Oscillatory circuits Forced oscillators
Week 6: Oct 2, 4	Non-homogeneous linear ODE's More on forced oscillators
Week 7: Oct 9, 11	Spring combinations Coupled oscillators
Week 8: Oct 16, 18	More on coupled oscillators Partial differentiation
Week 9: Oct 23	Exam #2
Oct 25	Transvers waves on a taut string Wave equation
Week 10: Oct 30, Nov 1	Superposition principle, interference Standing waves
Week 11: Nov 8	Energy and momentum transport associated with wave propagation (Nov 6 – No class, Election Day)
Week 12: Nov 13, 15	Electromagnetic waves Phase and group velocities
Week 13: Nov 20	Fourier series THANKSGIVING BREAK (Nov. 22 – 24)
Week 14: Nov 27	More on Fourier series
Nov 29	Exam #3
Week 15: Dec 4 Dec 6	Fourier transform Review
Week 16: Dec 14	FINAL EXAM