PHYSICS 311 – OSCILLATIONS AND WAVES  
Autumn Semester 2013

LECTURES: Tue. & Thu. 11:10 a.m. – 12:00 noon, CHCB 231

INSTRUCTOR: Eijiro (‘Ebo’) Uchimoto  
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Office hours: Mon. 11:10 a.m. – 12:00 noon, Tue. 2:30 p.m. – 3:30 p.m.,  
Wed. 3:10 p.m. – 4:00 p.m., Thu. 12:30 p.m. – 1:30 p.m.,  
Fri. 10:10 a.m. – 11:00 a.m., (and by appointment).

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

PRE/COREQUISITE: Calculus III (M 273 Multivariable Calculus)

NO. OF CREDITS: 2 credits

SCOPE:  
· Development of physical intuition and mathematical skills needed for analyzing a wide range of periodic phenomena.  
· Detailed study 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.

TEXTBOOK: None. Will use my notes/manuscript.

HOMEWORK: Reading assignment and problem sets.

EXAMS: Three midterm exams (Thu. 9/19, Tue. 10/22, and Tue. 11/26)  
One final exam (10:10 a.m. – 12:10 p.m., Wed. 12/09/13)

GRADING:  
problem sets 25 %  
midterm exams 45 % (15 % each)  
final exam 30 %

[This course can be taken for a refined traditional letter grade only.]

Mon 9/16 – Last day to add/drop courses by CyberBear. Last day to change grading option to audit.  
Mon. 10/28 – Last day to drop courses with a drop/add form but without the deans signature.
## TENTATIVE COURSE OUTLINE:

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| 1    | 8/27, 29  | Introduction  
Simple harmonic motion (SHM)  
Complex numbers |                |
| 2    | 9/3, 5    | More on SHM  
Linear ordinary differential equations (ODE’s)  
with constant coefficients |                |
| 3    | 9/10, 12  | Damped oscillators, three cases, Q-value |                |
| 4    | 9/17, 19  | Forced oscillators | **Exam #1** (9/19) |
| 5    | 9/24, 26  | More on forced oscillators, inhomogeneous linear ODE’s |                |
| 6    | 10/1, 3   | Coupled oscillators, normal modes |                |
| 7    | 10/8, 10  | More on coupled oscillators  
Transverse waves on a string |                |
| 8    | 10/15, 17 | 1-D wave equation, solution methods |                |
| 9    | 10/22, 24 | 2-D and 3-D wave equations | **Exam #2** (10/22) |
| 10   | 10/29, 31 | Superposition principle, interference |                |
| 11   | 11/5, 7   | Phase and group velocities |                |
| 12   | 11/12, 14 | Energy and momentum transport associated with wave propagation |                |
| 13   | 11/19, 21 | Electromagnetism, electromagnetic waves, |                |
| 14   | 11/26     | quantum mechanics | **Exam #3** (11/26) |
| 15   | 12/3, 5   | Review |                |
| 16   | Final’s week | **Final Exam** | **Final** (12/12) |

This course is accessible to and usable by otherwise qualified students with disabilities. To request reasonable program modifications, please consult with the instructor. Disability Services for Students will assist the instructor and student in the modification process. For more information, visit the Disability Services website at http://www.umt.edu/disability.