

# PHYSICS 401 – Intermediate Classical Mechanics

Information Sheet – Fall 2007

MWF 9-10, 335 West Hall

Prof. Keith Riles, 372 West Hall, 764-4652, kriles@umich.edu

Office Hours: Mon 10:30-11:30; Tues 10:00-11:00, 2:30-3:30 (or by appointment)

Text: Thornton & Marion *Classical Dynamics of Particles and Systems*, 5th edition.

Recommended texts on reserve in the Science Library:

- Symon, *Mechanics*
- Fetter & Walecka, *Theoretical Mechanics of Particles and Continua*
- Goldstein, *Classical Mechanics*

Course web site: <http://gallatin.physics.lsa.umich.edu/~keithr/p401/>

| Week | Lectures | Lecture Dates             | Chaps. | Topics (approximate)                         |
|------|----------|---------------------------|--------|--|
| 1    | 1,2      | Sep 5,7                   | 1      | Vectors, Matrices, Cylindrical Coordinates   |
| 2    | 3,4,5    | Sep 10,12,14              | 1-2    | Vector Calculus, 1-Particle Mechanics        |
| 3    | 6,7,8    | Sep 17,19,21              | 2      | Potential Energy, Equilibrium                |
| 4    | 9,10,11  | Sep 24,26,28              | 2-3    | Simple Harmonic Oscillator                   |
| 5    | 12,13,14 | Oct 1,3,5                 | 3, 5   | Forced Oscillations, Gravitation             |
| 6    | 15,16,17 | Oct 8,10,12               | 5-7    | Calculus of Variations, Hamilton's Principle |
| 7    | 18,19    | Oct 17,19 <sup>1</sup>    | 7      | Lagrangian Dynamics                          |
| 8    | 20,21,22 | Oct 22,24,26              | 7-8    | Hamiltonian Dynamics, Central Force Motion   |
| 9    | 23,24,25 | Oct 29,31; Nov 2          | 8      | Orbits, Planetary Motion                     |
| 10   | 26,27,28 | Nov 5,7,9                 | 9      | Dynamics of a System of Particles            |
| 11   | 29,30,31 | Nov 12,14,16 <sup>2</sup> | 9-10   | Non-Inertial Reference Frames                |
| 12   | 32,33    | Nov 19,21                 | 11     | Rigid-body Rotation, Inertia Tensor          |
| 13   | 34,35,36 | Nov 26,28,30              | 11-12  | Euler's Equations, Coupled Oscillations      |
| 14   | 37,38,39 | Dec 3,5,7                 | 12     | Normal Modes, Loaded String                  |
| 15   | 40       | Dec 10                    | 13     | Weakly coupled oscillators                   |

<sup>1</sup>Exam 1 in class Friday October 19 covering chapters 1-3, 5-6.

<sup>2</sup>Exam 2 in class Friday November 16 covering chapters 1-3, 5-9.

Final Exam: Tuesday December 18 10:30 a.m - 12:30 p.m. covering chapters 1-3, 5-12.

Grading: 30% Homework; 20% Exam 1; 20% Exam 2; 30% Final Exam

There will be 14 homework assignments, due at the start of each Wednesday lecture, beginning September 12. The final assignment will be due Monday December 10.

Assigned homework problems will be posted on the course web site at least one week before their due dates. Solutions will be posted on the web site after each Wednesday lecture. Both problem assignments and solutions will be posted in pdf (portable document format) files, a standard format recognized by computers at campus computing sites. Free software can be downloaded to home computers to read and print pdf files.

Because solutions will be posted immediately, **late homework will not be accepted.**