Classical Mechanics (PHYS 4003)

Course Syllabus: PHYS 4003 – Classical Mechanics I

Instructor: Dr. Kevin Cornelius, JSC 316, corneliusk@obu.edu
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Office hours posted on office door
Course website: http://plaza.obu.edu/corneliusk/cm/

Textbook: Classical Dynamics of Particles and Systems, *Marion and Thornton, 5th ed.*

Course Description: This is an upper level college physics course that emphasizes a systematic approach to the mathematical formulation of mechanics problems and to the physical interpretation of the solutions. Fundamental concepts and principles in classical mechanics will be applied to particles, systems of articles and rigid bodies. The mathematical framework developed in this course will consist of advanced mathematical and numerical techniques that will provide a solid mathematical background used in all modern physics.

University Learning Goals: The University Learning Goals may be found on the University Mission, Vision, and Values webpage at: http://www.obu.edu/about/vision-mission-and-values/

Departmental Learning Objectives:

Objective 1 - To gain an understanding of the history and knowledge of physics and the physics principles that shape our world. **ULG 1, 2, 5, 6**

Objective 2 - To develop problem solving and critical thinking skills. **ULG 1, 5, 6**

Objective 3 - To develop insight into the scientific process by making connections between ideas and elements not just within physics, but within all disciplines. **ULG 3, 4, 6**

Student Learning Outcomes:

At the end of this course, students will be able to demonstrate a proficiency to:

1. Demonstrate an intermediate knowledge of Newton's Laws. **DLO 1**
2. Demonstrate a basic knowledge of equations of motion. **DLO 1, 2**
3. Apply advanced Newtonian methods to complex motion problems. **DLO 1, 2**
4. Demonstrate an intermediate knowledge of oscillatory motion. **DLO 1, 2**
5. Describe and model the oscillations of damped and undamped systems. **DLO 1, 2**
6. Demonstrate a basic knowledge of Calculus of Variations. **DLO 1**
7. Demonstrate a basic knowledge of Lagrangian & Hamiltonian dynamics. **DLO 1**
8. Apply Lagrangian & Hamiltonian methods to complex motion problems. **DLO 1, 2**
9. Demonstrate an intermediate knowledge of central-force motion. **DLO 1, 2**
10. Apply advanced methods to complex central-force motion problems. **DLO 1, 2**
11. Generate solutions to mathematical problems using current data analysis software (*Mathcad*). **DLO 2, 4**
12. Apply the fundamental processes of investigation, modeling and analysis **DLO 2, 3**

Areas of Study:

Newtonian Mechanics – Single Particle	(Ch. 2)	
Oscillations	(Ch. 3)	
Lagrangian & Hamiltonian Dynamics	(Ch. 6-7)	
Gravitation & Central-Force Motion	(Ch. 5, 8)	***Final***: *Wed*., May 11th @ 2:00 pm
* *Dynamics of a System of Particles*	(Ch. 9)	

Homework:

Small homework sets will be assigned regularly during the course of the semester. These assignments will be due at the beginning of class on the day specified. It is expected that all students do their own work. Software, such as Mathcad, may be used so long as a printout of the work done is included with the homework. **No work shown = No credit given!**

** Extra credit reading summaries from the book will be accepted up until the day the capstone over that particular area of study section is due. **(*These are listed on the course website*)**

Capstones:

Capstone assignments will be given at the end of each major section of the study as listed above. These more advanced assignments will require students to solve more detailed theoretical problems, real world situations or practical applications.

Grading:

Grades will be determined from the following areas:

Homework:	45%
Capstones:	55%

Grades will NOT be posted. Come see me anytime for your current grade.

A = 100% – 88% B = 87% – 75 % C = 74% – 60 % D = 59% – 50 % F < 50%

Absences:

If you can pass this class without showing up, power to ya! However, don't come by my office and expect to get help on any assignments ***if*** you have not been showing up for class or doing the homework. Your success in our program is of great concern to me, but part of that success is you behaving like a responsible adult.

No Class:

There will be **NO** class on the following dates:

Spring Break: Mar. 21 – 25

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www.obu.edu/physics

Covenant on Academic Honor:

Students at Ouachita are obligated to uphold the Covenant on Academic Honor, which reads in part, "I will refrain from all forms of academic dishonesty, and I will act responsibly when confronted with the knowledge of such behavior." For the possible consequences of any violation of this covenant, please see **The Tiger Handbook**.

Americans with Disabilities Act:

Ouachita Baptist University is committed to extending access and opportunity to those who have disabilities. To request modifications or accommodations due to a disabling condition, or for a copy of the University policy concerning modifications or accommodations, contact Dan Jarboe, University Counselor and ADA/504 Coordinator, in the Student Services Office. His office is located in Evans Student Center and the telephone number is 245-5591. You may also email the University Counselor and ADA/504 Coordinator at jarboed@obu.edu.

Tips for Success:

1. Read the textbook. This will provide a second point of view of the material covered in class.
2. Solve problems. Physics is a performance discipline just like athletics or music. It is not a subject that can be learned solely through reading, regular practice is required. Work through the examples for the current chapter in the textbook and as many additional odd numbered exercises at the end of each chapter as possible for which the answers are provided.
3. Get help. If you have tried steps one and two and are still having problems, get help. A tutoring schedule will be posted outside of the Physics Department offices. This service is free. You should also talk to your professor. Your difficulties are probably not as big as you think.
4. Turn in homework and labs on time. Some credit is better than none at all.
5. Take good notes.
6. For optimal learning, recopy your notes after each lecture. Understanding may not come during class because information is coming hard and fast, but valuable insight often occurs as you go over the material again. This is also an excellent tool in preparing for tests.