Lecturer:	Dr. Tim Gorringe.
Office:	CP 273
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Textbook:	Physics for Scientists and Engineers. Serway and Jewett, 9th Edition.
Web page::	Canvas at uk.instructure.com

PHY231. Motion and matter. Spring 2018.

1 Course description.

PHY 231 is the first semester of a two semester sequence in introductory physics for science and engineering students. Physics 231 is about the motion and properties of matter. Physics 232 covers electricity, magnetism and light.

In PHY 231 we'll examine such topics as the trajectories of basketballs and footballs, the motion of the planets around the sun, why ships float, why planes fly, and the properties of materials such as steel, water and air. We will discuss force, energy and momentum and other concepts and fundamental principles in physics. Importantly, we'll sharpen your problem solving skills and critical thinking skills by applying these concepts and principles to wide-ranging situations.

The course is organized into four modules with four one-hour exams. The first module covers the description of motion and Newton's laws of motion. The second module covers the concepts and use of energy and momentum in understanding motion. The third modules is focused on applications of force and energy concepts to circular motion including the orbits of the planets. The fourth module concerns applications of force and energy concepts to solid bodies, fluid bodies and periodic motion.

Understanding motion and matter isn't about remembering lots of facts and equations, it's about applying basic concepts and fundamental principles to a wide variety of physical phenomena. While some algebra, calculus and trigonometry are important (the course prerequisites are MA113, MA114 and MA213), your success is determined by your understanding of fundamental concepts and your development of problem-solving skills.

Please read the syllabus carefully – if you have questions about the structure or the administration of the course you will probably find the answer here.

2 Course format.

PHY 231 comprises three lecture classes per week and one recitation class per week. The lecture classes for sections 11-15 are Mondays, Wednesdays and Fridays in CP155 at 11:-00-11:50 am. The recitations classes are each Tuesday.

Lecture time will be mostly devoted to the development, discussion and demonstration of the underlying physical principles of motion and matter. Before each lecture class you should read the assigned material that is listed below in the course schedule. Recitation time will be mostly devoted to developing and sharpening your problem solving skills, *i.e.* how to apply the physical concepts to real-life problems. Before each recitation class you should attempt the assigned homework.

3 Course grade.

Your course grade will be determined according to the following table:

Hour exams	4×100
Online homework	150
Lecture quizzes	100
Recitation tutorials	100
Evaluation bonus	10
Total	750+10

An overall score (out of 750) of 90% will guarantee an A-grade, 80% will guarantee a B-grade, and 70% will guarantee a C-grade. Further information on the hour exams, online homework, lecture quizzes and recitation tutorials is given below.

To succeed in PHY 231 it's very important to read the section assignments before each lecture class and attempt the homework assignments before each recitation class. Anticipate spending ten or more hours a week outside the classroom on reading and homework. Take an active role in the learning process – ask questions and talk with your recitation instructor, laboratory instructor, or lecturer if you don't understand something. When you read the textbook, identify the main concepts and their physical consequences. When you solve the problems, write down your solutions in a clear step-by-step manner.

3.1 Exam grades (4 × 100 points).

The scheduled dates / times and relevant material for the hour exams are given in the table below.

Exam	Material	Date / time	Place
1	Chap. 1-5	Feb 7 (Wednesday), 7:00pm	MDS building
2	Chap. 4.4-5, 6.1-2, 7, 8	Mar 7 (Wednesday), 7:00pm	MDS building
3	Chap. 10, 11, 13	Apr 4 (Wednesday), 7:00pm	MDS building
4	Chap. 12, 14, 15	May 1 (Tuesday), 10:30am	CP 155

Each hour exam will comprise a true-false section and a fully-worked problems section. For full credit on problems all working out – including relevant concepts, diagrams, equations and calculations – must be clearly shown. There are 100 points per hour exam.

During the hour exams you are not allowed to consult text books, reference books, or class notes. You are not permitted to use phones, laptops, tablets *etc.*, during exams. An equation sheet containing relevant formulas and physical constants will be provided with each exam, *i.e.* memorization of physical constants and basic equations is unnecessary. You must bring your own calculator to the exams.

3.2 Homework grade (150 points).

Every student must register with the WebAssign homework service for the required weekly homework assignments. To access the homework please connect to WebAssign via Canvas: 1). login to Canvas and navigate to PHY 231, and 2). click Modules and then the WebAssign link. The first time you access WebAssign from Canvas you are prompted to link your current WebAssign account or create a new WebAssign account.

The weekly homework cycle is as follows. Each Tuesday the weekly homework assignment will be available on the WebAssign site. The relevant material is then covered on the following Wednesday, Friday and Monday classes. The deadline for completing the online homework is at 11:59pm on the Tuesday immediately following this three-lecture sequence.

3.3 Recitation grade (100 points).

The recitation sessions are designed to help you learn how to apply the physical principles to solving quantitative problems. In recitation you work in small groups to solve worksheets that are distributed by your recitation instructors. These worksheets will be graded and the two lowest grades over the semester will be dropped. Students arriving over 10 minutes late to recitation class will not receive credit for the work completed on the group worksheet. Make-up recitations will not be granted for any reason.

3.4 Lecture grade (100 points).

Each lecture class will include concept quizzes. To participate in concept quizzes each student is required to have either a clicker or a mobile device and a TurningPoint account license. To register for TurningPoint via Canvas: 1). login to Canvas and navigate to PHY 231, then 2). click Modules and then the TurningPoint registration, then 3). follow the registration instructions.

The concept quizzes are multiple choice questions on the basic principles covered in the lecture material. Each concept quiz is worth four point – a correct answer will receive four points, an

incorrect answer will receive two points, and no response will receive zero points. Your accumulated semester score from concept quizzes will be capped at a 100-point total for the lecture quizzes.

3.5 Course evaluations (10 bonus points).

Course evaluations are an important component of our Departments instructional program. Our class will use the Universitys Online Teacher Course Evaluation System (TCE). You will receive an email invitation and frequent reminders to participate in the TCE during the TCE window. During the TCE window the evaluation will be available at evaluate.uky.edu/blue and can completed using a computer, tablet or smart phone. A 10 point bonus will be awarded to every student when the class participation in the Teacher Course Evaluation exceeds 80%.

4 Excused absences, etc.

If you miss a hour exam with a valid excuse, you will receive a score based on the average of your other tests and the final. If you miss two tests with a valid excuse, you will receive an incomplete (I). Examples of excusable absences are (University Senate rule 5.2.4.2): (i) Illness of the student or serious illness of a member of the student's immediate family, (ii) the death of a member of the student's immediate family, (iii) trips for student organizations, university classes, and intercollegiate athletics. Each case requires written verification. When feasible the student should notify the instructor prior to the absence, and never more than one week after the absence. Falling behind and sleeping in are not valid excuses.

Lastly, cheating on exams and copying of homework are very serious academic offences. Offenders are subject to punishment in accordance to University Senate rules section 6.3 and 6.4.

5 Important dates.

Classes begin on Wednesday, January 10 and end on Friday, April 27. During the semester there are several academic holidays: Martin Luther King Birthday (Monday, January 15) and Spring Break (Monday through Friday, March 12-16). The last day to drop a course is Friday, March 30.

6 Where to get help?

All instructors have office hours, or meet with them by appointment. In addition, you can get help at the Physics & Astronomy tutoring center in (room CP 133) and find a list of physics tutors in the Physics office (room CP 177) in the Chem-Phys building. Solutions to the homework will be available on our Canvas web-page after the due dates. Solutions to the examinations will be posted to the Canvas web-page after the completion of each exam.

DATE	MATERIAL	READING ASSIGNMENTS
W Jan 10	The dimensions of nature	1.1-6
F Jan 12	Describing motion and position, velocity and acceleration. I	2.1-5
M Jan 15	Martin Luther King Jr. Birthday	
W Jan 17	Describing motion and position, velocity and acceleration. II	2.1-5
F Jan 19	Falling bodies and constant acceleration	2.6-2.8
M Jan 22	Scalars, vectors and vector addition	3.1-3.3
W Jan 24	Unit vectors and vector addition	3.4
F Jan 26	Projectile motion and constant acceleration	4.1-4.3
M Jan 29	Relative motion and reference frames	4.6
W Jan 31	Force and Newton's laws of motion	5.1-4
F Feb 2	Gravity, weight and Newton's laws	5.5-5.6
M Feb 5	Applications of Newton's laws of motion	5.7-8
W Feb 7	**Review for test one, Chap. 1, 2, 3, 4, 5.**	
F Feb 9	Circular motion and Newton's laws I	4.4-5, 6.1
M Feb 12	Circular motion and Newton's laws II	6.1-2
W Feb 14	Concept of work done by forces	7.1-5
F Feb 16	Uncovering kinetic energy and potential energy	7.5-7.9
M Feb 19	Conservative and nonconservative forces and mechanical and internal energy	7.5-7.9
W Feb 21	Energy conservation with conservative forces	8.1-2
F Feb 23	Energy conservation and non-conservative forces	8.3-5
M Feb 26	Power and further examples of energy conservation	8.1-5
W Feb 28	Concepts of impulse and momentum	9.1-9.3
F Mar 2	Collision in one, two dimensions	9.4-5
M Mar 5	Center-of-mass	9.6-8
W Mar 7	**Review for test two, Chap. 4.4-5, 6.1-2, 7, 8, 9**	

DATE	MATERIAL	SECTION ASSIGNMENTS
F Mar 9	Kinematics of rigid body rotation	10.1-3
Mar 12-16	Spring Break	
M Mar 19	Dynamics of rigid body rotation	10.4-5
W Mar 21	Energy and rigid body rotation	10.6-9
F Mar 23	Concept of angular momentum	11.1-3
M Mar 26	Conservation of angular momentum	11.4
W Mar 28	Newton's law of universal gravitation	13.1-3
F Mar 30	Keplar's laws of planetary motion	13.4
M Apr 2	Gravitational potential energy	13.5-6
W Apr 4	**Review for test three, Chap. 10, 11, 13.**	
F Apr 6	Statics and equilibrium of solid bodies	12.1-3
M Apr 9	Statics and deformation of solid bodies	12.1-4
W Apr 11	Examples of forces and energy involving rigid bodies	12.1-4
F Apr 13	Fluid statics and Archimedes principle	14.1-4
M Apr 16	Fluids dynamics and Bernoulli's equation	14.5-7
W Aprl 18	Examples of forces and energy involving fluid bodies	14.1-7
F Apr 20	The spring and periodic motion	15.1-4
M Apr 23	The pendulum and periodic motion	15.5
W Apr 25	Examples and damped oscillations and forced oscillations	15.1-7
F Apr 27	**Review for test four, Chap. 12, 14, 15.**	