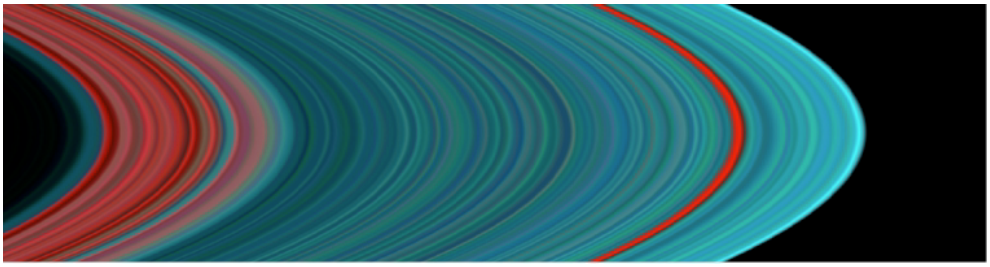

Syllabus V 1.2
PHY 2053C Section 0001
Physics 1, Spring 2015
Tuesday, Thursday 10:30 - 11:50 AM, MSB 260

Professor: Dr. Josh Colwell
Office: Physical Sciences Building (PSB) 434
Contact info: E-mail: josh@ucf.edu (this is by far the easiest way to contact me.)
Telephone: 407-823-2012
Telephone for in-class texting: 480-382-3749
AIM ID (AIM, ichat, etc): colwellastronomy
Office hours: M 2:00-3:00 p.m. T 4:30-5:30 p.m. W 10:30-11:30 a.m.

Website: Homework assignments will be completed on MasteringPhysics.com. Class notes, grades, and announcements will be made on Webcourses (accessible from myUCF).

Textbooks:

• *College Physics* (3rd edition), by Knight, Jones and Field, **and** Physics 2053 Lab Manual. The UCF Bookstore carries a customized "Volume 1" of the textbook for our course. This includes the access code to the masteringphysics.com website for homework as well as access to an electronic version of the book. There is no guarantee that you will use this textbook for Physics 2, so you will probably be better off just getting Volume 1 instead of paying for the full book.

• *In-Class Interactive Response System*: We will be using the ***Learning Catalytics*** Interactive Response System that comes with Mastering Physics (access with your textbook). This requires that you have a Wi-Fi-enabled device such as a smartphone, tablet, iPod Touch, or laptop computer with you in class everyday. Please contact me immediately if this is a problem so that we can find a device you can use for the semester. This will take the place of the more-familiar "clicker" devices and questions. If I refer to "clickers" or "clicker questions" it means questions answered through Learning Catalytics in class.

Assignments and Grading:

Your final grade will be based on the following:

Two in-class exams (two highest of three exams): 35%
Final exam (cumulative): 25%
Laboratory and in-lab exercises: 20%
Homework: 10%
In-Class Learning Catalytics questions: 10%

There will be three in-class exams during the semester, and a cumulative final exam. The lowest of the regular mid-terms will be dropped. **If you miss an exam for *any* reason, that will be your dropped exam.** Therefore, you should plan to make your best effort on all mid-terms. Because the final is cumulative, it gives you an opportunity to show you have learned material from the early part of the course where you might not have done as well on earlier exams. Therefore, if it helps your grade to do so, the final exam will count for 33% of your grade and the midterms for only 27%.

First Assignment:
As of Fall 2014, all faculty members are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the Syllabus Quiz Assignment on Webcourses@UCF (Canvas) by the end of the first week of classes, or as soon as possible after adding the course. Failure to do so will result in a delay in the disbursement of your financial aid.

Late homework will have a 25% penalty for each day past the due date. All homework will be completed on masteringphysics.com. Plan ahead to avoid the inevitable connectivity or other technical problems. One homework assignment will be dropped to handle the case where you cannot turn in an assignment for some reason.

Your three lowest clicker day scores will be dropped to handle unavoidable absences. You must bring your device every day. If you do not have it, or it is not functioning for some reason, check in with me at the beginning and end of class so that I can record your attendance.

Everything done in your laboratory sections counts for 18% of your overall course grade. The lab exercises will help you learn the material and will therefore also help you do better on your exams.

All assignment and exam grades are final 72 hours after they have been returned. Contact me before this 72-hour period is over if you have a grading dispute. See the rest of the missed work policy below. Plus and minus grades (A-, B+, etc.) will **NOT** be given. The default letter grade scale for non-exam items will be:
A: 88-100 B: 75-88 C: 60-75 D: 50-60 F: below 50
I reserve the right to adjust the grade scale, and the grade scale for exams will be posted after each exam with adjustments (a “curve”) if any. These adjustments will only help your grade.

Course Description and Requirements: PHY2053C is the first in a two-semester sequence in introductory physics offered primarily for students majoring in information technology, the biological science and pre-health professions. Emphasis is placed on understanding major principles and concepts, and quantitative examples with algebra with simple trigonometry is used to clarify and illustrate them. Students should have a good working knowledge of algebra and trigonometry at the level of MAC1104 and MAC1114 or equivalent.

Information about this course (syllabus, class-notes, etc.) will be available on webcourses (Canvas, myUCF, or whatever I'm supposed to call it these days). In addition, I will use your official UCF e-mail to send you announcements from time to time, so be sure to check your e-mail daily. The website will be frequently updated as the course progresses itself. All homework assignments will be on the Mastering Physics website.

This is a fast-paced course. The content of this course is selected to match nation-wide standards for Physics courses, which are often used to prepare students for careers in Medicine and Life Sciences. During the course we will typically work one chapter per week. Your primary sources of information for the new concepts are your instructor (me), the textbook, online tutorials and materials at masteringphysics.com, and your class notes. The syllabus shows which sections you need to read for each day of class. Here is an estimate of the effort needed for PHY2053C:

- Reading 20-30 pages of text each week – 3 hours.
- Web-based homework & time studying concepts – 5 hours
- Laboratory – 3 hours
- Classroom time – 3 hours
- Estimated weekly effort – 14 hours

You can see that you need to plan on having enough time to do your best in this class.
It is extremely important not to get behind. Physics builds on itself inexorably, and once you are behind it will be very difficult to catch up with it again. And don't assume that because you read a section, you understand it. Until you can consistently do the problems successfully, you don't understand the material.

Course Objectives, Or, Why Am I Learning About How Fast a Wheel Rolls Down a Hill?
Aside from the practical matter that UCF is presumably requiring you to take this course to get your degree, there is actually some value to you in learning the material! Physics is, in many ways, a much simpler scientific discipline than ones you may be majoring in. For that reason, it allows us to easily see fundamental principles such as conservation of energy work. It is an excellent test case for the scientific method and for quantitative thinking and reasoning. For those going into the medical profession, the experiments you perform in life sciences will be much more difficult to interpret than those we do in Physics. Thus, this is an opportunity for you to see simple quantitative reasoning applied to real-world situations and see them work at high precision.

The emphasis of this course is on motion and how things move. The main topics we will cover along with the important topics per chapter that you should know are:

- Mathematical Background for Physics.

Units and formulas. How to do algebraic operations with units and how to be dimensionally consistent in our calculations by using units from the same System (e.g. SI system). How to use units to: 1) check the validity of a formula via dimensional analysis 2) find the units of an unknown quantity in a formula. Vector analysis. How to do operations (addition and subtraction) with vectors. What are the polar and what are the Cartesian coordinates. How to write the components of a two dimensional vector with Cartesian and with polar coordinates. How to use basic trigonometry in Physics.

- Linear Motion in one and two dimensions.

Position and Displacement in one and two dimensions. Difference between displacement, position and distance. Average and instantaneous speed. Average and instantaneous velocity. The equations of motion with constant speed and constant acceleration in one dimension (along a straight line). Free fall.Graphical analysis if position, velocity and acceleration vs. time. The equations of motion in two dimensions. The concept of independence of motions. The role of initial conditions in solving problems involving motion in one and two dimensions. Motion under the influence of gravity in two dimensions (projectile motion).

- Force and its relation to translational motion.

Vector addition of forces and the resultant force. The 3 laws of Newton and their application. The Normal force. Frictional forces. The coefficient of friction. Static and kinetic friction. Tensions from strings. Elastic forces from springs. Application of the 3rd law of Newton (action and reaction) when I have more than one bodies that push or pull each other. Motion of a system of bodies pushing each other or pulling each other with strings. Motion of bodies connected with a string passing through a pulley. The Atwood's machine. Equilibrium: How to find the condition of equilibrium for bodies interacting with each other (pushing or pulling each other), hanging with strings (or springs), with or without friction. Motion of bodies on the inclined level with and without friction.

- Circular motion.

The role of the tangential and centripetal components of the acceleration. The centripetal force. Motion of cars taking a turn on an unbanked and on a banked road. Newton's Universal law of Gravity. Motion of satellites around the Earth. Gravitational force as centripetal. Apparent weight in accelerating elevators. Weightlessness and artificial gravity in rotating space station.

- Kinetic and Potential Energy. Power.

Work done by a constant force. The concept of kinetic energy and its relationship to work done by a force. The work-kinetic energy theorem. Work done by elastic forces (forces from springs). Gravitational and elastic potential energy. Conservative and non conservative forces. The conservation of total mechanical energy when we have and when we do not have dissipative (con-conservative) forces.

- Linear Momentum and conservation of linear momentum.

Definition of momentum. Re-expressing the Newton's 3 laws in momentum form. Relationship between the law of Conservation of Momentum and Newton's third law of action and reaction. Conservation of momentum in problems involving explosions and plastic collisions. Elastic and inelastic collisions. Elastic collisions. Isolated system of bodies and conservation of momentum. The Center of Mass of a system of bodies and its motion.

- Rotational Motion.

Rotational Motion and parameters we need to describe the rotational Motion. Angular displacement, angular velocity and angular acceleration. Right hand rule and the vector nature of angular velocity and acceleration. Rotational motion of extended rigid bodies. Relationship between the angular velocity and the translational speed. Relationship between the angular velocity and the centripetal component of the translational acceleration. Relationship between the angular acceleration and the tangential component of the translational acceleration. The equations of rotational kinematics with constant angular acceleration and with constant angular velocity. How from the equations of translational motion we can derive the equations of the rotational motion.

- Energy and Power in rotational motion.

The concept of moment of inertia. Kinetic energy in rotational motion. Moment of Inertia of various rigid bodies. Usage of conservation of energy law to study composite (rotational and translational) motion.

- Torque and its relation to rotational motion.

Definition of torque and its vector nature. How to find the torque induced by forces with respect to a point. The Moment Arm. Rotational equilibrium of rigid bodies. Newton's three laws for rotational motion. Work and power of a torque in rotational motion.

- Composite rotational and translational motion.

The Rolling motion. Rolling with constant speed and rolling with constant acceleration. Rolling motion on an inclined level. Kinetic energy in rolling motion. The conservation of energy in rolling motion. Torque in rolling motion. The role of friction in rolling. Difference between rolling and sliding. Motion of bodies connected with a string which passes through a pulley with non negligible mass and size. The motion of a yo-yo.

- Angular Momentum.

Calculation of angular momentum of a moving particle. Angular momentum of an extended rotation object. Angular momentum as a vector. Expression of Newton's three laws for rotation in Angular Momentum form. Conservation of Angular Momentum in a system of objects. Applications in collision. Examples where although linear momentum is not conserved, Angular Momentum is conserved. Angular Momentum and stability (balance) of a moving extended object.

- Waves and Oscillations.

Concepts of waves, frequency, amplitude, wave propagation speed and periodic motion in general.

The mission of the course is to learn tools of critical and quantitative analysis and thinking, using Physics as a model. You do not need to memorize the formulas you encounter (you may bring an equation sheet to exams), but you have to master a number of important concepts and know how to apply your knowledge on a broad range of problems in Science and Technology. We will learn techniques to check our answers to make sure they are reasonable. We will learn the importance of experimentation on which our theories are built. We will learn problem-solving techniques.

Homework: Homework plays a central role in this course. If you have understood the underlying concepts the exercises are straightforward, but if you are trying to guess the "right equation" you will fail unnecessarily. Since homework is so important for your understanding the material, expect approximately one per week. No homework extensions will be given. Homework scores are reduced by 25% for each day homework is submitted after the due date. Assignments will be submitted on the MasteringPhysics web site. You will get an access code for this web site with the textbook when purchased from the bookstore or you can purchase an access code at the bookstore or via the web. The main website is www.masteringphysics.com, and there are links for student support as well as access to login to your account on that main page. There will be one assignment per chapter. Twelve percent of your grade will be determined from your average homework score. Doing your homework will help you prepare for your exams! If you take the time to do the homework yourself and understand it, you **will** get a higher grade in the course than if you use someone else's solutions.

The code to enroll in this course on MasteringPhysics is: COLWELLPHY2053SPRING2015

Examinations: Thirty-eight percent of your grade will be determined from the average score from the two highest scores of three midterm examinations. Another twenty-five percent will be determined from a comprehensive final examination. The exams may be problems to be worked out, multiple choice questions, or a combination of two. ***I emphasize understanding of concepts over numerical "plug-and-chug" problem solving.*** You must have with you at least one number two (2) pencil, and a computer scored answer sheet (a pink scantron) at every exam. You also must know your student ID number and record it accurately in the proper location on the Test

Form and on each written exam so that the computer can keep track of your scores as the term progresses. A non-graphing, non-programmable calculator may be used during exams. The Office of Disabilities Services will provide reasonable accommodation to students with disabilities. A valid UCF photo ID card is required when you turn in your exam answer sheet.

Teaching Method:

Content: We will cover the following chapters in the textbook in this order: 1-6, 10, 9, 7-8, 14. Classes will include demonstrations and examples of working through problems. I will be posting draft versions of the notes on the class website before class, and final versions including clicker question answers on the website after class. I may also make podcasts of the class available. You may also wish to share notes with other students. The reading assignments in the schedule below are to be completed before class on the day listed. The design of the classes will assume that you have completed the reading assignment.

Questions: I favor an interactive classroom environment. Be prepared to ask and answer questions. Time permitting, I will answer your questions in class. There will also be a mechanism for you to send in questions by text message during class if you are uncomfortable asking it aloud (see number for texting at top of syllabus). If you are confused about a topic or would like to follow-up, please come to office hours or make an appointment for another time.

Lectures: Lectures will be a combination of demonstrations, computer slide presentations, examples (given on the screen via projector from a camera recording my writing), and interactive response questions. I will post lecture materials on the course web site, but these are not a substitute for attendance.

Supplemental Instruction: Supplemental instruction (SI) is an academic success and retention program for historically difficult courses. SI uses regularly scheduled study sessions led by peers called SI leaders. SI leaders have taken the course before and received an “A”. They undergo continuous training in proactive strategies to conduct effective SI sessions. SI leaders attend all classes, take notes, and do all the assignments. They conduct 4 SI sessions each week. During these sessions, SI leaders help students apply study strategies to the course content. SI leaders help students work cooperatively using the textbook, lecture notes, and other materials to build accurate information, solve problems, work on sample tests and practice to prepare for exams. SI leaders do not relecture but create a comfortable atmosphere for teamwork and group study and models effective study habits. In SI sessions, students learn how to integrate course content and study skills while working together.

SI sessions are voluntary, anonymous, and free to all students enrolled in courses that offer SI. Students who attend SI have a wide range of academic backgrounds and ability. Research shows that students who attend SI sessions on a regular basis can earn on an average one half to a full letter grade higher than their peers who do not attend SI.

Missed Work Policy: It is Physics Department policy that making up missed work will only be permitted for University-sanctioned activities and bona fide medical or family reasons. Authentic justifying documentation must be provided in every case (and in advance for University-sanctioned activities). At the discretion of the instructor, the make-up may take any reasonable and appropriate form including but not limited to the following: giving a replacement exam, replacing the missed work with the same score as a later exam, allowing a dropped exam, replacing the missed work with the homework or quiz average. Note that for this class, the dropped exam is the default policy for a missed exam for ***any*** reason. This is also the policy for homework and clicker absences.

Learning Catalytics Policy: The policy for Learning Catalytics questions is different than that for homework and exam questions: **You may not use anyone else's device to submit questions. If you do, both of you will receive a grade of F for the class.**

Golden Rule: Please read this information at the website http://goldenrule.sdes.ucf.edu.

UCF Creed: Please read this information at the website http://www.campuslife.sdes.ucf.edu/UCFcreedpage.html.

Conduct: Please don't have any sidebar conversations during class. There will be ample opportunity for you to talk during class at certain times. We will take a 2-3 minute break each day, and you are also encouraged to talk during the Learning Catalytics questions. However, it is imperative that the class is quiet at all other times so that your fellow students are not distracted. I encourage you to raise your hand and ask relevant questions in class or text me a question.

Disability Access Statement: As stated on the website http://www.sds.ucf.edu/Faculty_Guide, "The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. This syllabus is available in alternate formats upon request. Students with disabilities who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations. Students who need accommodations must be registered with Student Disability Services, Student Resource Center Room 132, phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, before requesting accommodations from the professor."

Collaboration Policy: You may not collaborate on exams. Exams will be of the usual closed-book, closed-notes type. Some clicker questions may be answered individually (at the beginning of class, to check reading comprehension), while in general they will encourage group discussion.

Email: It is very likely that I will need to send email to you regarding class logistics or material. These e-mails will go to the e-mail address on record at UCF. In addition, announcements will be posted on Webcourses. If you write an email to me, please identify yourself in it, and **please**

include PHY2053 in the subject line. Send e-mail to my UCF e-mail (given above), NOT within Webcourses or Mastering Physics.

Calculators and Laptops: Calculators may be used for exams and for clicker questions. You may take notes on a laptop. However, **you may not use your laptop for FaceBook, web surfing, or other activities not directly related to class.**

Schedule (next page)

Physics I - PHY 2053C0001 - Spring 2015

Date	Reading	Topic	Demonstrations
Jan. 13	Chapter 1	Representing Motion; Motion Diagrams; Vectors; Vector Addition	M23, M33
Jan. 15	Sections 2.1-2.5	One-Dimensional Motion	M10 or M12
Jan. 20	Sections 2.6-2.7	Free-fall and solving 1-D Motion Problems	M14, M16, M20
Jan. 22	Sections 3.1-3.4	Vector math and components	
Jan. 27	Sections 3.5-3.8	Two-Dimensional Motion and Problem-Solving	
Jan. 29	Sections 4.1-4.3	Introduction to Forces	
Feb. 3	Sections 4.4-4.7	Newton's Laws and Solving Force Problems	
Feb. 5	Catch up and Review	Chapters 1-4	
Feb. 10	Catch up and Review	Chapters 1-4	
Feb. 12	**Exam 1**	**Chapters 1-4**	
Feb. 17	Sections 5.1-5.4	Equilibrium; Mass and Weight; Normal Forces	
Feb. 19	Sections 5.5-5.8	Friction; Drag; Ropes and Pulleys	
Feb. 24	Sections 6.1-6.3	Uniform Circular Motion	
Feb. 26	Sections 6.4-6.6	Orbits and Newton's Law of Gravity	
Mar. 3	Sections 10.1-10.4	Work and Energy (Skip Rotational Kinetic Energy part of 10.3)	

Date	Reading	Topic	Demonstrations
Mar. 5	Sections 10.6-10.8	Conservation of Energy; Power	
Mar. 17	Catch up and Review	Chapters 5, 6, 10	
Mar. 19	**Exam 2**	**Chapters 5, 6, 10 (no collisions)**	
Mar. 24	Sections 9.1-9.3	Impulse and Momentum	
Mar. 26	Sections 9.4-9.6	Conservation of Linear Momentum	
Mar. 31	Sections 7.1-7.3	Rotational Motion and Torque	
Apr. 7	Sections 7.4-7.7	Rotational Dynamics and Moment of Inertia; Center of gravity	
Apr. 9	Section 9.7 Section 10.3	Conservation of Angular Momentum Rotational Kinetic Energy	
Apr. 14	Catch up and Review	Chapters 7, 9, collisions	
Apr. 16	**Exam 3**	**Chapters 9, 7, 10.3, Collisions**	
Apr. 21	Sections 8.1-8.3	Static Equilibrium and Hooke's Law	
Apr. 23	Sections 14.1-14.3	Simple Harmonic Motion	
5-May	**10:00a.m. - 12:50p.m.**	**Cumulative Final Exam**	

We may adjust the schedule according to how long it takes us to cover each chapter.
Reminder: if you have questions, please ask. If you don't understand the material: see me in office hours; make an appointment if you cannot make office hours; take advantage of the Supplemental Instruction; study with your peers.

One Last Item:

This syllabus is subject to change. The latest version will always be available on Webcourses.
[Revision history: v1.0. December 10, 2014
v1.1: Update schedule. January 6, 2015
v1.2: Change grade weighting of lab and homework. January 9, 2015]