

PHY 160 - Engineering Physics - Mechanics

Course Syllabus

Spring Semester, 2012

Section 1: MWF 10:00 – 12:20

Section 2: MWF 2:00 – 4:20

Instructors: Dr. Timothy J. Garrison
102 KEC
815-1710
garrison@ycp.edu

Office Hours: M, W, F 1:15 – 1:45
T 2:00 – 3:15
Th 1:30 – 3:15

Dr. Scott Kiefer
114 KEC
815-1520
skiefer@ycp.edu

Office Hours: M, W, F 4:30 – 5:00
T, Th 10:00 – 12:00

Required Texts: *Fundamentals of Physics*, D. Halliday, R. Resnick, and J. Walker, J. Wiley, 9th Edition, New York.
Exploratory Physics, T. Garrison, 1st Edition

Electronic Resources: Considerable information will be posted and distributed through the Blackboard site for this class. Students are responsible for becoming familiar with the site and for obtaining the necessary resources.

Prerequisites: Mat 171 (Calculus I) with a grade of 2 or better.

COURSE DESCRIPTION: A calculus-based physics course in mechanics for engineering and science majors. The use of vectors is emphasized throughout this course. Topics include vectors, linear and rotational motion, Newton's Laws, friction, work and energy, conservation of linear and angular momentum, collisions, moments of inertia, simple harmonic motion, gravitation and (if time permits) waves.

COURSE OBJECTIVES: The primary objective of this course is to develop a proficiency in applying Newton's laws and energy conservation principles. As part of this objective, students will be required to incorporate mathematical principles (including vectors and differential and integral calculus) along with the basic physics laws to study a wide range of practical engineering problems. Another objective is to prepare students for future courses in engineering and science.

COURSE OUTCOMES: Outcomes for this course are listed below. The mapping of the course outcomes back to the program outcomes is shown in parenthesis. Students completing this course should have:

- CO-PHY160-1 – An ability to understand basic kinematics (translating and rotating) and to construct x/v/a diagrams (a,e)
- CO-PHY160-2 – An ability to solve a projectile motion problem (a,e)
- CO-PHY160-3 – An ability to construct a free-body diagram (a,e)
- CO-PHY160-4 – An ability apply Newton's laws for translational and rotational motion (a,e)
- CO-PHY160-5 – An ability to function within a group environment to perform physics analyses (d)
- CO-PHY160-6 – An ability to use DataStudio for solution of Physics problems (k)
- CO-PHY160-7 – An ability to effectively communicate homework and activity solutions following prescribed formats (g)
- CO-PHY160-8 – An ability to apply conservation of energy to translating and rotating systems (a,e)
- CO-PHY160-9 – An ability to design, conduct and interpret data from physics experiments and demonstrations (b)
- CO-PHY160-10 – An ability to perform basic vector operations including addition, resolution, dot and cross products (a,e)

COURSE STRUCTURE: The course meets for 130 minutes three times per week. The class periods will be used for various learning techniques. A detailed discussion of the course structure is given in the preface of the text *Exploratory Physics*.

<u>GRADING:</u>	Homework/Activities/Electronic Responses 15%	Homework will be approximately <u>weekly</u>
	Exam 1 21%	Tentative date: February 17
	Exam 2 21%	Tentative date: March 23
	Exam 3 21%	Tentative date: April 27
	Final 22%	During finals period

GRADING SCALE: The grading criteria for this course will follow the York College guidelines given below:

4 (Excellent): This grade denotes accomplishment that is truly distinctive and decidedly outstanding. It represents a high degree of attainment and is a grade that demands evidence of originality, independent work, an open and discriminating mind, and completeness and accuracy of knowledge, as well as an effective use of the knowledge.

3.5 (Very Good): This grade denotes mastery of the subject matter. It represents very good achievement in many aspects of the work, such as initiative, serious and determined industry, the ability to organize work, and the ability to comprehend and retain subject matter and to apply it to new problems and contexts.

3 (Good): This grade denotes considerable understanding of the subject matter. It represents a strong grasp and clear understanding of the subject matter and the ability to comprehend and retain course content.

2.5 (Above Average): This grade denotes above average understanding of the subject matter. It represents a good grasp of the subject matter and the ability to comprehend and retain course content.

2 (Average): This grade denotes average understanding of the subject matter. It represents the grade that may be expected of a student of normal ability who gives the work a reasonable amount of time and effort.

1 (Below Average): This grade denotes below average understanding of the subject matter. It represents work that falls below the acceptable standard.

0 (Failure): This grade denotes inadequate understanding of the subject matter. It signifies an absence of meaningful engagement with the subject matter and that the student is not capable of doing or understanding the work or has made little or no effort to do so.

The numerical algorithm which will be used to determine the grades is given below. This scale is subject to change.

Grade	Course average
4	90 – 100
3.5	87 – 89
3	80 – 86
2.5	77 – 79
2	70 – 76
1	60 – 69
0	0 – 59

PARTICIPATION AND ATTENDANCE: The instructors strongly believe that regular attendance and participation in classroom activities is critical in learning the subject matter. In order to emphasize its importance, *class attendance and participation are required for this course*. Role will be taken each class and students will be required to participate in each class. *To be considered in attendance for a class, students must arrive by the official class starting time and students may skip answering no more than one electronic response question per class period. Students coming to class late will be considered absent for the class. Likewise, students who skip answering two or more electronic response questions will be considered absent for the day.* Students will be allowed to have three unexcused absences without penalty. Each unexcused absence above three will result in a one percentage point penalty subtracted from the student's final grade. Students will not be penalized for excused absences (e.g. illness) provided an official notice or excuse is provided (e.g. a doctor's note). Should a student be late for or miss a class, it is the student's responsibility to make up for the absence. This includes getting handouts that were distributed, turning in assignments that were collected (possibly subject to a late penalty), getting notes for the class, determining what announcements were made, and any other relevant actions. Students who miss an exam or quiz will receive a grade of "0" and will not be allowed to retake the exam/quiz unless a valid doctor's excuse is provided for the absence.

Each class will typically have a 10 minute break approximately halfway through the class period. Students must return from break by the designated re-start time. *Students returning late from the break will be considered absent.*

HOMEWORK POLICY: Homework problems will be assigned on a weekly basis and due dates will be given on the homework assignment sheet. Generally, homework will be due on Wednesdays. Homework is due *before* class starts. Assignments turned in after class starts will be considered late. Homework turned in late, but within one day of the due date, will receive a 25% reduction; homework turned in within two days of the due date will receive a 50% reduction. *No credit will be given for homework turned in more than two days late.*

Students may *discuss* their homework solutions with one another, but each student must submit their own, **independent** solutions (i.e. you may not just copy someone else's homework or any portion of it). If you receive assistance from a fellow student on a particular problem you must cite that assistance within your solution. Any work involving the presentation or analysis of data, including but not limited to tables, graphs, and figures, may not be used by anyone except the person who created the item. This includes any work produced through the use of a computer program such as Excel or Data Studio – only the person who created the item may submit the item for credit. If you have questions or doubts about whether an item is group or individual work, please ask one of the instructors.

HOMEWORK FORMAT: The importance of producing a neat, organized, high-quality homework assignment cannot be overstated. A homework assignment should be something you are proud of and not something hastily “slapped together.” Toward this end, considerable emphasis will be placed on not only getting the correct answer but also on how the solution is presented. You are required to follow the homework guidelines listed on the attached page. Each homework assignment must be accompanied by a coversheet. A blank copy of the coversheet is attached to this syllabus.

HOMEWORK GRADING: Homework problems must be worked correctly for credit. Problems worked incorrectly, incompletely, or not in the proper format (see attached sheet) will receive no credit. Students will grade a portion of their own homework assignment and a portion will be graded by the instructors. Part of the grade on each homework assignment will be based on how well the required homework format is followed.

EXAM GRADING: After completion of an exam, each student’s exam will be graded and a *temporary* score will be assigned. To make the temporary score permanent, each student must redo any problems done incorrectly on the exam and resubmit their work with the proper solution on a separate sheet of paper. Failure to submit corrected exams or re-submissions with erroneous or incomplete work will result in additional deductions from the temporary exam score. The intent of this rule is to foster reflection on one’s mistakes so that they are not repeated in the future.

OFFICE HOURS: Assistance is available from the instructors during posted office hours, or by appointment. If the posted hours are in conflict with your schedule, feel free to schedule an appointment to accommodate you. Additionally, we make it a point to come to class early. This is an excellent time to get help. Also, you can send questions or comments via email.

PROFESSIONALISM: One of the stated goals of York College is to train students on professionalism including the standards and expected behavior of one’s chosen profession. With this in mind, the course instructors expect the following from every student, consistent with the conduct of an individual practicing in a professional field such as engineering, teaching, and computer science:

- Respect for and courteous interaction with peers, faculty and facilities;
- Integrity, which includes at its core honesty, responsibility and accountability for one’s own actions;
- Sensitivity and appreciation for diverse cultures, backgrounds, and life experiences which promote engineering excellence;
- Constructive evaluation, which means that criticism is offered and accepted in a productive manner;
- Self-reflection and identification of one’s own strengths and weaknesses;
- Responsibility for one’s own education and learning;
- An attitude that fosters professional behavior in colleagues and peers;
- Punctuality at meetings and class sessions;
- Attentive behavior during class sessions, avoiding personal or social use of cell phones, laptops, or other electronic devices;
- Acknowledgement of the Kinsley Engineering Center as a professional workplace, and treatment of this facility as a business or office space, not as an informal space.

The faculty reserve the right to enforce this code through the York College Code of Student Conduct, including but not limited to removal of offending students from meetings, classes or (in extreme circumstances), from the program entirely.

“HOUSE RULES”: To insure effective instruction and use of classroom time, the rules listed below will be enforced at all times during the class. Students who fail to abide by these will be subject to grade penalties.

- No food or drink is permitted in the classroom.
- Cell phones may not be used for any purpose including text messaging during class. Cell phones must be put away during class. Students caught texting or using phones during class will be treated as absent and penalized accordingly.
- All electronic devices should be turned off during the class period.
- No tobacco products may be used in the classroom.
- Students are expected to remain in the classroom for the entire period and should not leave the classroom without the instructor’s permission.
- Students are expected to sit upright, be alert, participate in class discussions and act professional at all times.

COMMUNICATION STANDARDS: York College recognizes the importance of effective communication in all disciplines and careers. Therefore, students are expected to competently analyze, synthesize, organize, and articulate course material in papers, examinations and presentations. In addition, students should know and use communication skills current to their field of study, recognize the need for revision as part of their writing process, and employ standard conventions of English usage in both writing and speaking. Students may be asked to further revise assignments that do not demonstrate effective use of these communication skills.

ACADEMIC INTEGRITY: York College's mission statement stipulates that strict adherence to principles of academic honesty is expected of all students. Therefore, academic dishonesty will not be tolerated at York College. Academic dishonesty refers to actions such as, but not limited to, cheating, plagiarism, fabricating research, falsifying academic documents, etc., and includes all situations where students make use of the work of others and claim such work as their own.

When a faculty member believes a student has committed an act of academic dishonesty, the faculty member must inform the student in writing and then has ten business days from that written notification to the student to report the incident to the Dean of Academic Affairs and the Department Chair. Documentation related to instances of academic dishonesty will be kept on file in the student's permanent record. If the academic dishonesty is the student's first offense, the faculty member will have the discretion to decide on a suitable sanction up to a grade of 0 for the course. Students are not permitted to withdraw from a course in which they have been accused of academic dishonesty.

Students who believe they have been unjustly charged or sanctioned (in cases involving a first offense) must discuss the situation with the faculty member and have 10 business days thereafter to submit an appeal to Student Welfare Committee through the Dean of Academic Affairs. If an appeal is filed, the Student Welfare Committee will then conduct a hearing to review the charge and/or sanction. In cases of a first offense, the faculty member may request that the Student Welfare Committee conduct a hearing and decide on the sanction, which can involve academic suspension or dismissal from the College, if the faculty member believes the offense to be of an extremely egregious nature.

If the Dean of Academic Affairs determines that the academic dishonesty is the student's second offense, the Dean will provide written notification to the student, the faculty member, and the Department Chair. The Student Welfare Committee will automatically conduct a hearing to review the charge and decide on an appropriate sanction, which will involve academic suspension or dismissal from the College. Students who believe the Student Welfare Committee has unjustly sanctioned them may submit a written appeal to the Dean of Academic Affairs within 72 hours of receiving notification of the Student Welfare Committee's sanction.

STUDENTS WITH DISABILITIES: If you are a student with a disability in need of classroom accommodations and have not already registered with Linda Miller, Disability Support Services Coordinator, please contact her at 815-1785 or lmille18@ycp.edu to discuss policies and procedures related to disability services and establish the accommodations for which you are eligible. Students with documented disabilities (e.g. extended test time) are responsible for making all accommodations for their exams. This includes notifying one of the course instructors at least 7 days prior to the exam and making arrangements with the Learning Resource Center to schedule a test time.

MISSED CLASSES: It is expected that students will attend every class period. Occasionally a student may need to miss a class. Should a student miss a class, it is their responsibility to take immediate corrective action for their absence. At a minimum this includes: notifying the instructors of your absence; submitting any assignments that were due to the instructors as soon as possible (Note that for unexcused absences late assignments will be subject to penalties as described in the section titled Homework Policy on page 2 of the syllabus); obtaining any handouts that were distributed during the missed class (extra handouts are often kept in the Physics classroom and can also be obtained from the Blackboard site); completing the missed notes and activities by borrowing the missed materials from a classmate; providing a copy of a medical excuse to the instructors if the absence was for a valid medical reason; and talking with an instructor or classmate about any announcements made in class.

STUDENT COMMITMENT: Students should be aware that this course is difficult and requires a substantial commitment. The course is worth 5 credits, meets for 6 hours and 30 minutes each week, and will likely require 15 hours or more each week to complete assignments, perform the required reading, and to study for exams. Students who are unwilling to commit to this level of investment are unlikely to succeed.

ELECTRONIC RESPONSE SYSTEM (Clicker): Each student will be assigned a clicker remote for submitting electronic responses. The clickers are numbered and the students must use the same clicker each class period. Clickers are to be picked up before class starts and must be returned after class is over. Please notify the instructor if the clicker you have been assigned is not functioning properly. Clickers damaged as a result of student carelessness or neglect must be replaced at the expense of the student. As noted above, to be considered in attendance for a class, students may skip answering no more than 1 electronic response question per period. Also, students will be awarded points for each correct answer submitted via the electronic response system and those points will contribute toward the final class grade as noted in the Grading section of the syllabus.

COURSE SCHEDULE: A schedule will be disturbed each week which contains the reading and homework assignments.

DISCLAIMER: This syllabus and the course schedule are subject to revision by the instructors.

HOMEWORK FORMAT RULES

In doing your homework, you are required to follow the instructions listed below:

- Use a pencil - Do NOT use a pen.
- Completely erase any extraneous material - NO scratched out material should appear on the solutions
- Show all the pertinent details of how you obtained your solution
- Staple your assignment together - Do NOT use paper clips, dog earing, or other means to assemble your homework.
- Write legibly, in print large enough to be read easily.
- Use 8 ½ by 11 inch paper. Do NOT use paper torn from a spiral binder unless it is perforated and you can neatly remove the ragged edge.
- Use graph paper on problems requiring graphs or make your graphs using a computer program such as Excel.
- Use straight edges to draw diagrams, schematics, etc.

Each homework problem must follow the structure given below:

<u>Given:</u>	Concisely state the problem, including relevant sketches, units, etc.
<u>Find:</u>	State what is the goal of the problem (i.e. what is unknown)
<u>Assumptions:</u>	List all assumptions used in solving the problem
<u>Plan:</u>	A sentence or two on how you plan to attack the problem
<u>Estimate:</u>	Estimate what you think the answer might be (don't look at the answer first!)
<u>Solution:</u>	Give a step-by-step solution of the problem, including explanatory sentences. You must have units for every number, show your units calculations, and put a box around your final answers.
<u>Discussion:</u>	Comment on your solution, note if your answer makes sense, problems you had, how good your estimate was, etc.

Additional features of a GOOD homework

- Each problem should have a neatly drawn figure. If you are not a true artist, you should use a straight edge. Also, the figure should be large enough to be easily read and important variables associated with the problem should be labeled on the figure. A well drawn figure will greatly help you solve the problem and help me understand your solution.
- Each solution should be well organized. Labels for parts a), b), c) etc. should be easy to locate and the solution should be placed in the proper section.
- Don't cram your solutions into a small space. There should be lots of "white space" in your solution. Leave blank lines between steps; this makes it much easier to grade and gives me room to make comments. Start each problem on a new page.
- A homework solution should be capable of being "read" just like a textbook example problem. This means that you include all the pertinent details of the solution as well as text to help the reader follow your analysis. (Include sentences in your solutions not just equations.) Explain what you are doing, tell where you have taken an equation from, etc.
- Any variable used should be described in words or clearly shown on a figure.
- For nearly every problem your approach should be:
 1. While you are writing the given & find think about the problem. Think about what you know and don't know; think about which fundamental law might relate the quantities; form a strategy!
 2. Start your solution with a very general equation (such as Newton's law, conservation of energy, conservation of momentum, etc). The equation should be written with symbols only.
 3. Simplify the equation and state why you have made your simplifications (eg. $K_i = 0$ since the initial velocity is 0). Show all of the details. There should be words in your solution.
 4. Once the equation is simplified, then plug in the numbers. **EVERY NUMBER REPRESENTING A PHYSICAL QUANTITY MUST HAVE UNITS WITH IT!!!**
 5. Calculate the final answer and determine the final units. (Don't just slap the final units on.)
 6. Ask yourself if the answer makes sense (e.g. you calculated a negative velocity but the object is moving in the positive direction - correct solution: go back and look for your error; wrong solution: slap in a negative sign somewhere and hope the teacher doesn't notice.)
 7. Only at this point should you check your answer with the book's answer. If you are off, go back and rethink your analysis. If you can't find a good reason for you mistake, **DO NOT JUST FORCE THINGS TO GET THE CORRECT ANSWER; GET HELP SO YOU CAN FIND YOUR MISTAKE!!!**

