Pre-requisites: Calculus I (MATH 1296 or 1290). This course requires fluency in mathematics from algebra, geometry and trigonometry through differentiation and basic integration from calculus (with a strong conceptual grasp of both those calculus topics).

Co-requisite: PHYS 2014 General Physics Lab I

Text: University Physics, 13th ed. by Young & Freedman. This is delivered as an e-text and is combined with access to MasteringPhysics used for some assignments. It will be direct-billed to your student account. Information on signing up for this is available from the course web page.

Clickers: Student response system devices will be required for credit for class participation. These need to be registered through Moodle before January 19.

Online homework: Some assignments will be submitted online through MasteringPhysics.

Catalog description: Calculus-based introduction to Newtonian mechanics, fluid mechanics, and heat.

Course contents: The broad goals of the course are: to acquire both a conceptual understanding and a usable knowledge of fundamental physical principles of classical physics in the area of mechanics that govern the behavior of matter at the macroscopic (as opposed to microscopic) level, and develop quantitative problem solving skills. Beginning with quantitative descriptions of motion of simple objects (kinematics and vectors), we will move through dynamics, (forces and their consequences), introduce work and energy, and consider powerful conservation laws about energy and momentum that can be used in studying systems from two to many objects. We'll apply and extend these ideas to describe rotational motion, and then move onto a survey of fluids, gases, and thermodynamics.

Grading: The course grade will be based on the following weighted contributions:

Tests (3) – 42%  
Final Exam – 24% (Tuesday, May 3, 4 pm.)  
Assignments (online and hand-in) – 18%  
Class participation via clickers – 8%  
Weekly discussion sections – 8%

The expected letter grade scale will be: >85% = (A-,A); >70% = (B-,B,B+); >55% = (C-,C,C+); >45% = (D,D+)

A grade of A will represent the demonstrated ability to analyze situations conceptually and to solve problems at various levels of difficulty, including those requiring the application of calculus.

Reading: Keep up with reading assignments! Not all topics in the text will be covered during lecture. Reading the text carefully for comprehension is important and takes time. When reading the text, you should read actively: that means using paper and pencil to work through calculations and examples yourself, and making notes – particularly about questions you may have. Working through examples in detail so that you understand them and can reconstruct the process on your own is very important. Many of the online assignments will be intended to keep you current with reading assignments.

Discussion sections: Weekly discussion sections meet Friday and are an opportunity to work problems in a smaller setting, and get some coaching from the discussion instructor. Think of it as physics practice, and getting good at anything requires significant practice, preferably with feedback. Absence from discussion lowers your grade.
**Class participation/clickers:** Clickers (aka student response systems) will be used to pose questions in lecture. These questions can be based on assigned reading and used to encourage in-class thought and discussion of material during lecture. Points will be assigned to these activities. The contribution to the course grade will be based on 95% of the total points possible through these questions. This will be the only allowance for missed classes or technical problems with clickers. *Aside from note-taking on a tablet device, fiddling with other electronic gadgets, including phones and laptop computers, is distracting to other students. Please turn them off and put them away.*

**Assignments:** Success in this course will require careful reading and extensive practice in applying the principles of physics presented to solving problems. You will have frequent short assignments of Reading Questions. These are usually simple questions to provide a gauge of your reading retention and comprehension. Some will be through the online MasteringPhysics system, some will be posted and may serve as the basis for a short in-class quiz at the start of lecture. Additionally, practice with lots of problems is essential. Both written and online homework will be assigned. You can get help working practice problems at help sessions most afternoons run by graduate teaching assistants in physics. Another resource is the Tutoring Center, [http://www.d.umn.edu/tutoring/](http://www.d.umn.edu/tutoring/), and of course office hours are available.

Online assignments will have specified due dates. (1) **Reading Questions** (RQ) may be short questions posted through the course web page or assigned through MasteringPhysics and are to be completed **before** class on the specified date. (2) **Online homework** problems will be due by 11 pm on the due date in MasteringPhysics. (3) **Written problem sets** to be handed in are due at the **start** of class on the specified due date. These problem set solutions must follow the homework expectations below to receive full credit. Typically one or two problems from each problem set handed in will be selected for grading.

You are encouraged to discuss problems and work collaboratively - it's a good way to learn the material. However, you are responsible for being able to explain and defend your solution if asked. Solutions copied from or essentially identical in phrasing and layout to another student's work (or from solutions manuals or online services) are unacceptable. Answers primarily copied from solutions manuals or other comparable resources constitute cheating.

**Other make-up work:** Make-up tests will be available only for documented (in writing) excused absences per University policy, with notification to the course instructor as soon as is practical in the case of emergencies, or with advance notice in the case of University-mandated absence.

**Liberal education:** Phys 2013 taken with Phys 2014 constitutes a course with lab in the Natural Sciences category. It provides foundational knowledge of the laws that govern everyday phenomena and cultivates the ability to apply these ideas at the conceptual level and quantitatively by developing problem solving skills.

**Disabilities:** If there are aspects of this course that result in barriers to your inclusion or your ability to meet course requirements, please notify the instructor as soon as possible. Contact the Office of Disability Resources (KSC 258) to discuss and arrange reasonable accommodations. Please call 218-726-6130 or visit the DR website at [www.d.umn.edu/access](http://www.d.umn.edu/access) for more information.

**University Policies:** Information about various applicable University policies should be reviewed at [http://www.d.umn.edu/vcaa/SyllabusStatements.html](http://www.d.umn.edu/vcaa/SyllabusStatements.html)

Details of the course procedures and policies described here may be amended and posted as deemed appropriate by the instructor.