

## ISE 150: *How Things Work* (CRN 11100) Winter 2018

**Instructor:** James Vidricksen

**Office:** None (virtual meetings by arrangement)

**E-mail:** jvidricksen@oakland.edu (this is the best way to reach me.)

**Office Phone:** None (please use email)

**Class Time/Location:** All classes will be online, with the exception of two in-class sessions

- 10:00 am – 12:00 pm on 3 Feb. (midterm)-- Mathematics and Science Center 93
- 10:00 am – 12:00 pm on 21 Apr. (final exam)— Mathematics and Science Center 93

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In this class, your lectures and the accompanying quizzes are all online. The videos mean that you can stop your professor/instructor and replay what she/he is saying as much as you like. You are expected to watch the online videos on Moodle, and take the accompanying brief Moodle quizzes by the posted due dates. There are also occasional online homework assignments, as noted in Moodle. You have two in-class sessions. The dates and locations are noted above.

Realistically, to do well, you should be able to put in at least **six hours per week** for the fourteen weeks of this course—roughly three hours per week watching videos or (occasionally) meeting with your class, and at least three more hours reading the books, doing homework, and interacting with your classmates on or offline.

There are two sources of online materials for this course:

1. The first source of online materials is on Moodle, where you will find all videos and online quizzes related to *How Things Work*. You automatically go to our ISE 150 course when you log in to Moodle at Oakland University. You are expected to watch the online videos on Moodle, and take the accompanying brief Moodle quizzes by the dates stipulated in the schedule below.
2. The second source of online materials is also on Moodle, but deserves a special mention. The discussion forums for each section will be a key factor to success in the course. The forums should be used frequently for posting questions, answering questions from other posters, and contributing helpful comments or resources that benefit your fellow students. Participation in this way is an element of the final grade and is subjectively evaluated by the instructor.

Assignments are to be scanned into single document pdfs (not jpgs) and uploaded on Moodle. You can scan a pdf of your homework in Kresge Library for free. You can take pictures with your smartphone, convert them to pdfs, and then combine the separate pages by using this website:

<http://www.pdfcombine.com>. **Note that Moodle will not accept more than one document for your homework—you must have everything combined into one document. Also note that you must show your work to get credit when solving problems—you cannot submit numerical answers without showing how you they were derived.**

**Course Description:** For non-science majors: a practical introduction to engineering and science in everyday life. This course considers objects from our daily environment and focuses on their principles of operation, histories, and relationships to one another.

**This class satisfies the General Education requirements in Knowledge Applications**

**General Education Learning Outcomes:**

1. How knowledge in a field outside of the student's major can be evaluated and applied to solve problems across a range of applications

2. Knowledge of the personal, professional, ethical, and societal implications of these applications

### Course Objectives:

- Calculate quantities such as inertia, velocity, and acceleration for both regular and rotating objects. Use these calculations to determine, for example, how high a ball will fly, or how fast a car or a merry-go-round can accelerate.
- Be able to explain how force relates to work, and how work relates to potential and kinetic energy using the law of conservation of energy. Use these relationships to explain why a ramp makes it easier to lift an object.
- Explain in terms a bright high school student could understand the principle of conservation of momentum.
- Calculate, using Archimedes' principle, the buoyant force on a log that has been submerged underwater.
- Use Bernoulli's equation to calculate the pressure of water on a submarine's hull at 300 meters below the water's surface.
- Explain the three different types of ways a wood stove can convey its heat into a room.
- Describe how a compressor, evaporator, condenser, and throttling valve work together to make an air conditioner or heat pump.
- Describe the four strokes of an automobile engine. Explain why a diesel engine is more efficient than a regular car engine.

### Required Texts:

- *How Things Work: The Physics of Everyday Life*, 6th Edition, Louis A. Bloomfield

### Grade Determination:

- **Moodle Quizzes:** 30% of course grade
- **Assignments:** 20% of course grade
- **Midterm examination:** 20% of course grade
- **Final examination:** 20% of course grade
- **Class participation:** 10% of course grade
- **Grading Scale:** Class grade on a curve.

### Policies and Procedures

**Class Examinations:** The first midterm will cover chapters 1 and 2 in the book *How Things Work*. The final is comprehensive (it will cover *all* the material in the course from both *How Things Work*). The questions on the midterms are very similar to the style and content of the Moodle quizzes, so if you are preparing and doing well on those quizzes, that means you are probably preparing well for the tests, which will also be multiple choice. You are allowed to bring one 8 ½ by 11-inch sheet of note paper to the midterm; you can bring two 8 ½ by 11-inch sheets of paper to the final. You can use both sides of the paper to write—in your own handwriting—whatever you want to help you do well on the examinations. (You may **not** use a printer or copier to put anything on these sheets—everything on the sheets must be in your own handwriting.) You can bring a conventional calculator to use on the final examination. You may NOT use a cell phone calculator during the examinations.

**Assignments.** Completed assignments should be scanned and uploaded in the assignment slot on Moodle. The grading method of these assignments may vary. All problems may be graded on some assignments, while only key problems may be graded on others. It is recommended that you use the answer keys that will be provided once all assignments are turned in. You must show your work to get credit when solving problems. you can't just submit numerical answers without showing how you got them.

### Special Policies for this Course:

- Permission for exceptions from the normal classwork schedule must be requested in advance. (I will not make exceptions after the fact.)

- I will not fail a student who makes a serious effort at all the assigned work and who works with me to succeed in the course. If you do not participate in homework assignments or do not take two or more quizzes or the final examination, it becomes possible for you to fail the course.

**Academic Conduct Policy:** Cheating on examinations, plagiarism, falsifying reports/records, and unauthorized collaboration, access, or modifying of computer programs are considered serious breaches of academic conduct. The Oakland University Academic Conduct Policy will be followed with no exceptions. It may be found on the OU website at [www.oakland.edu/?id=1610&sid=75](http://www.oakland.edu/?id=1610&sid=75).

**Add/Drops/Withdrawals:** The University add/drop and withdrawal policies will be explicitly followed. It is the student's responsibility to be aware of the University deadline dates.

**Special Considerations:** Students with disabilities who may require special considerations should make an appointment with campus Disability Support Services. Students should also bring their needs to my attention as soon as possible.

**Syllabus changes:** I reserve the right to make adjustments in this syllabus by announcing the adjustments via email.

ISE 150 Schedule: Winter 2018		
8-14 Jan.	Chapter 1: Laws of motion (translational)	<ul style="list-style-type: none"> <li>• Ice breaker activity – post your resume (or contact me for alternative assignment)</li> <li>• Quiz 1-1 <i>How Things Work</i></li> <li>• Assignment 1a</li> </ul>
15-21 Jan.	Chapter 1: Laws of motion (translational) (cont.)	<ul style="list-style-type: none"> <li>• Quiz 1-2 <i>How Things Work</i></li> <li>• Quiz 1-3 <i>How Things Work</i></li> <li>• Assignment 1b</li> <li>• Comment on at least two other resumes</li> </ul>
22-28 Jan.	Chapter 2: Laws of motion (rotational) (cont.)	<ul style="list-style-type: none"> <li>• Quiz 2-1 <i>How Things Work</i></li> <li>• Quiz 2-2a <i>How Things Work</i></li> <li>• Assignment 2a</li> </ul>
29 Jan.-4 Feb.	Chapter 2: Laws of motion (rotational) (cont.)	<ul style="list-style-type: none"> <li>• Quiz 2-2b <i>How Things Work</i></li> <li>• Quiz 2-3 <i>How Things Work</i></li> <li>• Quiz 2f <i>How Things Work</i></li> <li>• Assignment 2b</li> </ul>
3 Feb.	Midterm, Chapters 1 and 2 <i>How Things Work</i> . (Note that the midterm does NOT cover Chapter 3 of <i>How Things Work</i> ) 10:00 – noon Mathematics and Science Center 93	
5-11 Feb.	Chapter 3: Mechanical objects (springy things)	<ul style="list-style-type: none"> <li>• Quiz 3-1a <i>How Things Work</i></li> <li>• Quiz 3-1b <i>How Things Work</i></li> <li>• Assignment 3a</li> </ul>
12-18 Feb.	Chapter 3: Mechanical objects (springy things) (cont.)	<ul style="list-style-type: none"> <li>• Quiz 3-2 <i>How Things Work</i></li> <li>• Quiz 3-3 <i>How Things Work</i></li> <li>• Assignment 3b</li> </ul>
19-25 Feb.	Winter recess	<ul style="list-style-type: none"> <li>• No work due this week</li> </ul>
26 Feb-4 Mar.	Chapter 4: Gears & such	<ul style="list-style-type: none"> <li>• Quiz 4 <i>How Things Work</i> (questions only from the video, not book)</li> </ul>
5-11 Mar.	Chapter 5: Fluids	<ul style="list-style-type: none"> <li>• Quiz 5-1 <i>How Things Work</i></li> <li>• Quiz 5-2a <i>How Things Work</i></li> <li>• Assignment 5a</li> </ul>
12-18 Mar.	Chapter 5: Fluids (cont.)	<ul style="list-style-type: none"> <li>• Quiz 5-2b: <i>How Things Work</i></li> <li>• Assignment 5b</li> </ul>
19-25 Mar.	Chapter 7: Heat and phase transitions	<ul style="list-style-type: none"> <li>• Quiz 7-1a <i>How Things Work</i></li> <li>• Quiz 7-1b <i>How Things Work</i></li> <li>• Assignment 7a</li> </ul>
26 Mar.-Apr. 1	Chapter 7: Heat and phase transitions	<ul style="list-style-type: none"> <li>• Quiz 7-2a <i>How Things Work</i></li> <li>• Quiz 7-2b <i>How Things Work</i></li> <li>• Quiz 7-3 <i>How Things Work</i></li> <li>• Assignment 7b due</li> </ul>
2-8 Apr.	Chapter 8: Thermodynamics	<ul style="list-style-type: none"> <li>• Quiz 8-1 <i>How Things Work</i></li> <li>• Assignment 8a</li> </ul>
9-15 Apr.	Chapter 8: Thermodynamics (cont.)	<ul style="list-style-type: none"> <li>• Quiz 8-2a <i>How Things Work</i></li> <li>• Quiz 8-2b <i>How Things Work</i></li> <li>• Assignment 8b</li> </ul>
16-20 Apr.	Review	
21 Apr.	Final examination (Comprehensive—covers all material from <i>How Things Work</i> that was covered in the course) 10:00 – noon Mathematics and Science Center 93	

### Advice from former students in the class about this course

- Read from the book when you don't understand something. It's a really good resource
- Ask for help. If you really don't get something, Prof. Oakley is always there to help. She won't leave you hanging.
- Don't worry if you're not the greatest at math. The equations are simple to do and follow. Have fun!

- I would suggest you keep all equations and formulas in one readily available place like the front couple pages of your notebook. This way you don't have to flip through pages and pages of notes to find the equation you need.
- Embrace your group if you make one. Working as a team toward a goal works best when everyone participates. The benefit comes from effort and involvement.
- Be ready to have fun. Be ready to be changed.
- Do your homework and study!
- Dr. Oakley will work with you and help you as much as she can.
- Pay attention to detail, especially concepts! Using the wrong equation for a problem is common if you don't have a solid understanding of abbreviated terms and associated units.
- Think about how physics applies in one's life, helps in understanding concepts.
- Professor Oakley will teach you what you need to know to get an A.
- Learn more about the turboencabulator, haha!
- If you need help all you have to do is ask.
- As Dr. Oakley questions! She loves to see her students learning and grasping the subject at hand.
- Do extra homework problems if you don't understand something.