

# ECE 197ME Fall 2011

## Methods of Engineering

### Course Information

#### Goals and Objectives

The objective of this course is to review, refine, adapt, learn, and internalize some of the quantitative skills you are expected to know to succeed in engineering. These include:

- basic mathematical literacy, such as working with fractions, doing algebra, and using exponents;
- basic scientific literacy, such as scientific notation and units; and
- intermediate quantitative skills, such as understanding graphs, functions, inequalities, the binomial expansion, limits, and scaling principles, solving quadratic equations, working with logarithms, exponentials, trigonometry, and geometry, and manipulating vectors.

#### Instructional Approach

The term you will likely hear most often is "mastery". Course credit is earned entirely and exclusively through mastery of 19 online modules and 4 computer assignments covering all the topics of the course. There are no weekly homework assignments or quizzes and no midterm or final exams. Since the modules are administered online, you may retake them. This means that if you do not master a module, it does not count against you, but if you do master a module, it counts toward your semester grade. The questions and contexts will change with every attempt, but the central concepts and techniques do not change. Thus, if you have truly mastered the material, you can be given any problem, be asked any question, and you will be able to answer it correctly.

It is strongly recommended that you attend all classes. These will help you learn the concepts and techniques needed to demonstrate mastery in the online modules and computer assignments.

#### Course Format

**Lecture:** Two 75-minute lectures per week (TuTh 9:30–10:45, in Marcus 8 or LGRT 1334)

**Mastery Modules:** Nineteen online tests, administered by OWL

**Computer Assignments:** Two Excel projects and two MATLAB projects, all of which will be made available under Assignments (use nav-bar on the left) and done by each student outside the classroom on the computer

## Instructor

**Bill Leonard**

Marcus 8B

545-3513

[leonard@ecs.umass.edu](mailto:leonard@ecs.umass.edu)

Office Hours: MW, 2–3, or any time I am in my office

## Textbooks

No textbook is needed for this course.

## Course Components

There is no weekly homework in this course and no weekly quizzes. There are no semester exams, and there will not be a final exam. Instead, your grade will be determined by the number and type of online modules you successfully master. Computer assignments will potentially adjust your semester grade as described below. Thus, there are only two required components in this course: Computer assignments and Mastery modules. We will be using a mastery approach for both.

**Computer assignments.** During this semester, you will learn the rudiments of Excel and MATLAB. There are 4 projects, with a total of 10 problems, 5 each in Excel and MATLAB, for a maximum of 100 points. Descriptions will be available in [Assignments](#) (in the nav-bar on the left). Due dates are every other week of the semester from early October until before Thanksgiving break. Each computer assignment can be resubmitted without penalty at any time before the last day of classes.

**Mastery modules.** There are a total of 19 online modules, administered by OWL.

Each module has 10 questions. To earn mastery, you must answer all 10 questions correctly in a designated secure setting.

There will be multiple attempts available for each required module. You only need to master **one** of the attempts. If you fail to master any particular attempt, it does not count against you. You simply make another attempt at that module.

For more information, go to [Modules](#).

## Grading

To earn a C, you must:

1. master 14 modules, of which five are from the first 6 modules (B1 through B6), one is from the next 2 (B7 and B8), two are from the next three (B9–B11), three are from the next four (B12–B15), and three are from the last four (B16–B19);
2. earn at least 8/10 on each of 10 problems in labs and projects.

If you do not meet both of these criteria, your maximum possible grade is C–.

Once you have earned a C, you earn one grade increment (e.g., C to C+) for each of the following:

- Master one additional module.
- Earn 15 "Bonus" points.

There are a number of different ways to earn Bonus points:

- Fill out a survey (1 point each; 3 surveys maximum).
- Master all of the modules within a group (3 points each; 15 points maximum);
- Attempt a module without mastering it (your best score; 9 points/module maximum).
- Earn 82 or more points on projects (1 Bonus point for each 2 points above 80; 10 Bonus points maximum).

**Note:** If you do not satisfy the requirements for a C, the highest possible grade you can earn is C–, no matter how many modules you master and how many Bonus points you have earned.

For more detailed information about grading, go to [Grading](#). If you are not sure exactly how you will be graded, please talk to Prof. Leonard.

## Exams

There are **no** evening exams, and there is no final exam. Your grade is determined entirely by your score on computer assignments and the number and type of online modules you master.

## Homework

There is **no** required homework in this course. However, associated with each Mastery module will be a Practice exercises, also administered by OWL. Although these are completely optional, they will serve the role of homework, as they help you to prepare to master the required modules. We recommend that you spend about 1 1/2 hours working on the Practice module associated with each Mastery module. Note that answering all the Practice questions correctly once does not necessarily mean you are ready to make a Mastery attempt. Use the "Redo Question" button often, so that you can see different contexts and check to make sure you have mastered the material.

## Collaboration vs. Cheating

You are encouraged to work together on Practice modules and computer assignments; however, you must master required modules on your own, and you must submit your own solutions to computer assignments. Keep in mind that the Practice modules are designed to help you to understand the material and also to prepare you for the Mastery modules, so do not rely too heavily on other students for help. Academic dishonesty (either taking or giving answers on a required module, use of extra crib sheets, theft of another's work, etc.) will be dealt with harshly; you will receive an F for the course, and the Ombuds Office will be notified immediately.

# Modules

## Overview

The core of the instructional design is a set of 19 modules. The more modules you master the higher your semester grade. There are no exams, and there is no required homework.

Modules are administered by OWL, so you may attempt each one multiple times. Each module contains 10 questions, and you must answer all of them correctly to earn "mastery".

We want to ensure that credit for mastering modules is awarded fairly and appropriately, so all required modules must be attempted in a secure setting.

## Mastery

For each module, there are multiple "Mastery" attempts available on OWL, each listed as a separate assignment. They are all labeled "Required", but you need only master 1 attempt in a secure setting to earn mastery for that module.

Mastery attempts are administered by OWL in "Exam" mode, which means you have a time limit, and you see the feedback only when you have either run out of time or you submit your exam to be graded. The correct answer will not be provided as feedback. You will be told your scores on individual questions, and you will be told which answers are wrong.

Mastery attempts that have been made can be reviewed only at the secure site. You can also email Prof. Leonard with any questions you might have.

Mastery attempts will not be discussed in lecture, on the Discussion board, or in office hours when there are other students present. You may not discuss Mastery attempts with classmates. If you have a question about a Mastery attempt, please send an email or make a private appointment to talk to Prof. Leonard.

## Practice

Associated with each set of Mastery attempts is one or more Practice exercises. These may be done individually or with classmates. They must be attempted outside the secure setting. Practice exercises do not count toward your semester grade.

Most Practice exercises are administered by OWL in "Question" mode, which means there is no time limit, and you see feedback after you submit your answer to each question. You can also try a different context for the same question by clicking on "Redo Question" in the nav-bar on the left. The correct answer will be provided as feedback.

Some Practice exercises will be administered in "Exam" mode, so that you can become somewhat familiar with how all of the Mastery attempts will be administered, i.e., you need to answer all of the questions first before submitting your assignment to be graded by OWL, and you can navigate among the questions to check your answers.

Even though Practice exercises are labeled as optional, they will likely become the focus of most of your homework and studies. You can think of them as diagnostic, telling you what you need to work on and understand, and what you do not need to work on. If you have questions about the modules, they must be asked in terms of Practice exercises, for instance, during lecture and office hours.

## Designated secure site

Mastery modules are administered much like tests, so they must be attempted only at a secure location. There will be one or more monitors on site at all designated times. You will be required to sign in, show your ID and calculator, and sign out again. If you have not purchased one yet, you will be given a scientific calculator to borrow. You are allowed one bound lab notebook to write in. No cell phones, PDAs, etc. are permitted. No books or other resources are allowed. You may not talk to anyone.

The secure sites are DuBois 720/785 (7th floor, Tower Library) and Marcus 8. Starting September 11, and continuing while classes are in session (i.e., before Finals Week), one of the sites is available 6–10pm on Sunday through Thursday. The schedule is available on one of the Google calendars, at [Secure schedule](#). For changes to the schedule, check the Announcements page.

If you have any questions or concerns, please contact Prof. Leonard (5.3513 or [leonard@ecs.umass.edu](mailto:leonard@ecs.umass.edu)).

## Time limits

All of the modules have a time limit. If you have mastered the material, you should not need the entire time given. Time limits range from 40 to 75 minutes, depending on the difficulty of the module. (Most Practice attempts have no time limit, since they are usually administered in "Question" mode.)

## Mastery during Finals

You can continue to make Mastery attempts after classes are over. The secure site will be open for 12 hours during Finals Week (exact hours and dates yet to be determined). You will be allowed to sign up for 6 one-hour time slots. If you cannot find 6 time slots at the hours available for the secure site, you can sign up for time slots in Marcus 8B. You will be guaranteed a computer during these time slots. You can also visit the secure site and use computers that are available, but these are not guaranteed. Preference will be given to students who are close to earning a C but have not yet done so.

## Feedback

When the time limit has expired or you decide to submit your attempt to be graded before your time expires, you will receive feedback. For a few questions, suggestions or other comments will appear at the bottom of the question. For every question, you will be shown your last submitted answer and whether or not your answer is correct. For Practice questions, you will also be shown the correct answer.

You will not see the correct answers after doing a Mastery attempt. The reasons are threefold: (1) to discourage reverse engineering of the answer; (2) to encourage you to seek help from a professor; and (3) to permit resetting the clock on an attempt when you have made a minor error, such as mistype an answer. (For more information, go to [Guidelines](#) and look under the heading "Resetting Mastery attempts".)

## Special needs

If you have any special need, you should tell Prof. Leonard as soon as possible (5.3513 or [leonard@ecs.umass.edu](mailto:leonard@ecs.umass.edu)). For instance, if you need extended time on tests or if you cannot go to the secure site at any of the designated times, please let us know.

## Calculators

You will not be allowed to use your own graphing/programmable calculator at the secure site. Instead you should purchase a SHARP, model EL-531W scientific calculator. They are available at the University Store for less than \$15. You can get them even cheaper online. If you want to substitute another scientific

calculator, see Prof. Leonard before you go to the secure site, so that the calculator can be approved and the monitors notified.

## Recommendations

We strongly recommend that you spend at least 1 1/2 hours or so practicing each module before attempting it at the secure site (i.e., a Mastery attempt). If you have questions, you can ask them in lecture or during office hours. You should not use your graphing/programmable calculator to do Practice attempts; you should use the same calculator you will be using at the secure site, so that you are familiar with its layout and functioning.

Note that there are only 10 Mastery attempts for each module, though 4 of these are available only during Finals week. If you have failed to master 2 or 3 attempts in a row, do not make any more attempts. Instead, you should seek some advice and assistance.

You should keep a bound lab notebook with you during all Mastery attempts, and you should work out all problems in this notebook, sketching the circuits and writing down all equations and values for parameters. This is especially useful when you are visiting a professor with questions about a particular attempt. Keep the first 10 or 20 pages of your notebook blank, so that you can tape in photocopies of useful tables.

For a more complete list of recommendations, go to [Suggestions](#).

## Topics

The following table shows the content of each of the 19 modules:

<b>Module</b>	<b>Topics</b>
B1	Fractions
B2	Algebra
B3	Exponents
B4	Scientific Notation
B5	Significant Digits
B6	Units
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B7	Functions
B8	Inequalities
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B9	Logs and Exponentials
B10	Binomial Expansion
B11	Limits
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- B12 Graphs
  - B13 Power Laws
  - B14 Solving Quadratic Equations
  - B15 Solving Systems of Linear Equations
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- B16 Trigonometry / Basic Geometry
- B17 Vectors I
- B18 Vectors II
- B19 Scaling

# Grading

This page will tell you how you will be graded in 211, and give you some examples to help you understand the grading system.

## Requirements

Since there are no exams, quizzes, or weekly homework, your grade is almost entirely determined by how many and which modules you master. To earn a C in ECE 197ME, you must:

1. master 14 Basic modules, of which five are from the first six modules (B1 through B6), one is from the next two (B7, B8), two are from the next three (B9–B11), three from the next four (B12–B15), and three from the last four (B16–B19);
2. earn at least 8/10 points on all 10 problems within the projects.

## Grade Increments

Once you have earned a C, you earn one grade increment (e.g., C to C+) for each of the following:

- Master one additional module.
- Earn 15 "Bonus" points.

## Bonus points

There are a number of different ways to earn Bonus points:

- **Attempt a module without mastering it.** As you are working toward Mastery of a module, your best score counts! It is recommended that you keep trying until you master a module, but if you cannot, then your best score earns the same number of Bonus points (e.g., a best score of 8 earns 8 Bonus points).
- **Earn more than 81 points on projects.** You need at least 80 points on projects to earn a C in this course, but if you earn 82 or more points, you earn Bonus points, up to 10 Bonus points for a perfect score of 100. Since there is no penalty for resubmission, perfect scores are attainable for **all** students.
- **Fill out a survey.** At least 3 times during the semester, you will be asked to fill out an optional survey. Your answers are very important to us, so we offer 1 Bonus point for filling out each one.

**Note:** If you do not meet both requirements above needed for a C, the highest grade you can earn is C–, no matter how many modules you master and how many Bonus points you have earned.

If you are not sure exactly how you will be graded, please talk to Prof. Leonard.

# Guidelines

These guidelines cover rules of conduct at the secure testing sites, rules governing asking questions, and procedures for seeking resets after you have made a Mastery attempt.

## Secure testing (DuBois 720/785; Marcus 8B)

In order to maintain security and academic integrity in ECE 197ME, the following policies will be enforced by the tutors and monitors at all of the secure sites. If any of these are not met, they will file a report with the instructors.

- **No outside resources are allowed.** You are allowed one bound lab notebook with anything in it you want. There must be no loose sheets. (Photocopies should be taped down, for instance.) Loose sheets will be collected by the monitor and given to Prof. Leonard. No textbooks or other resources are allowed.
- **You may not use a programmable calculator.** You are required to use an approved scientific calculator during secure testing. The recommended model is the SHARP EL-531W. If you would like to substitute another model, check with Prof. Leonard first, so that he can tell the monitors. If you do not yet have an approved model, the monitor will give you one to borrow. In addition, for module B1 (Understanding Fractions) you may not use any calculator.
- **Machines must be logged on to an approved OIT account.** After you sign in, you will be assigned a station. When you leave, you must not log out of the OIT account. (You should only log out of OWL.)
- **Cell phones, PDAs, etc. are NOT allowed.** You should not answer your cell phone. (This is intended to be a test-like environment, and you certainly would not be allowed to use these during a test.) If you absolutely need to answer your phone (for instance, if you are an EMT), please tell Prof. Leonard before making any secure attempts, so that he can alert the monitors. NOTE: iPods, etc. are allowed, as long as the volume does not disturb anyone, that is, someone standing next to you should not be able to hear it.
- **No printing; no extra windows or tabs.** While you are at the secure site, you must work on your OWL Mastery attempts only. You are not allowed even to access your own Practice exercises. You should have one window open in OWL. You are not allowed to launch any application other than a browser. You are not allowed to print anything. NOTE: New windows are needed to send messages from OWL and also to access the Units of Measure table, so these are allowed.
- **You must sign out every time you leave the secure site.** Even if you need to use the bathroom, you need to sign out and then sign back in again. If you have not signed in and out with the monitor, the test does not count for Mastery or Bonus points.

## Asking questions

We encourage you to ask questions, but since different students make Mastery attempts at different times during the semester, it is necessary to have a policy governing how and when to ask appropriate questions.

- **You may not ask questions in a public setting about Mastery attempts.** For instance, in lecture, during office hours, or on the Discussion Board, questions about Mastery attempts will not be answered, since it is likely that others have not attempted the module yet. Specific postings about Mastery attempts on the Discussion Board will be removed immediately.

- **All questions asked in a public setting should be reframed in terms of Practice exercises.** If you have a question about a Mastery attempt, it is usually possible to ask it using situations from Practice attempts. If you cannot find a way, ask the professor to make up a circuit or problem that you can ask about.
- **All questions you have about Mastery attempts must be asked in private.** You can ask your question in an email to either professor, or you can make an appointment to visit either of us.

## Resetting Mastery attempts

Course instructors can reset the time on any Mastery attempt. That is, after you have submitted an exam to be graded, one of us can restart your timer. The exam content remains unchanged, and your answers are not lost. In other words, when you go back into your assignment, it is as though you never left; it's as though you never submitted the attempt to be scored by OWL. This allows you to change an answer that you entered the first time. The following explains when and why you will or will not be given a reset.

- **Only very minor mistakes earn a reset.** For instance, forgetting to enter units, typing the wrong units, or including units when none are required all qualify for a reset. Other examples are: transposing two digits, omitting a digit, or adding an extra digit in your answer; typing two decimal points; and typing a comma instead of a period for a decimal point. (Note: If you regularly require resets, at some point you will not qualify for them any more. This feature is intended to be applied only rarely, perhaps once or twice per student per semester.) If you are not sure if your mistake qualifies or not, just ask.
- **Most "stupid" mistakes will not qualify for a reset.** For instance, if you type the wrong sign, you will not earn a reset. Computing a basic quantity incorrectly does not qualify, for instance, if you divide current by resistance to calculate voltage. No matter how "obvious", "silly", or "stupid" the mistake seems to you, computational and algebraic errors do not qualify for a reset.
- **Only 2 resets per student will be granted.** You might never need a reset, but especially at the beginning when you are learning how to use OWL, it is possible to make careless mistakes. You should aspire to eliminating even the very minor mistakes, so the number of resets is limited. It is recommended to leave yourself five minutes at the end of each attempt devoted entirely to checking each answer you have entered and making sure it is exactly as you intend it to be. If you are not sure how to do this, please ask Prof. Leonard.
- **No resets will be granted in December.** By the end of November, you should be accustomed to both OWL and the Mastery approach, so it is up to you to find a way to stop making mistakes.
- **Running out of time does not automatically qualify for a reset.** If you have mastered the material you should not need the entire time period given. If you are prohibited from entering an answer because the secure site just closed, you will not earn a reset; that is, do not start a new attempt unless you are sure you have enough time to finish before the secure site closes. However, if you just miss getting your answers into OWL before you are closed out, immediately email the OWL administrators with the answers you intended to enter. Note that the time stamp from this message is critical: If too much time passes, you will not be granted a reset.
- **Having time left when the secure site closes does not automatically qualify for a reset.** It is your responsibility to manage your time. In this case, this means you need to know when a secure session ends, and you need to make sure you have enough time to complete an attempt before you start it. (OWL will not accept any responses after the secure session ends, even if you have time left.) If you just miss getting an answer into OWL, simply email those responses to Prof. Leonard, and we can work it out later.
- **Not knowing the syntax does not automatically qualify for a reset.** Typically, syntax issues are sorted out during Practice exercises. The Practice questions are similar enough to the Mastery questions

that nearly all syntax issues are the same in both. Thus, if you choose to skip the Practice exercises and dive right in to Mastery attempts, it is inevitable that you will make syntax mistakes. When this happens, you can view your Mastery attempt as "practice"; in other words, a reset will not be granted and you will need to make another Mastery attempt.

- **To receive the reset, you must send an email immediately after the attempt is graded.** As soon as you realize your mistake, use the OWL "Send Message" window to send Prof. Leonard an email. If the request is not made right away, then the reset will not be granted. (Under unusual circumstances, talk to the monitor; they know how to reach Prof. Leonard.)
- **Also to receive the reset, you must include an explanation and the answer(s) you will enter.** In other words, it is not enough to say that you "did something stupid," you need to explain what you did and exactly what you are going to change in your answer. Failure to do this nullifies the reset.

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If you have any questions or concerns, please contact Prof. Leonard.