WINTER 2018

To: SECS Faculty and EGR 1400 Students
From: Darrin Hanna, Ph.D., Professor of Engineering
Subject: EGR 1400 Course Outline (T R, 195 HHS)

COURSE TITLE

Computer Problem-Solving in Engineering and Computer Science

TEXT & MATERIALS

Starting out with Visual C# . ISBN 978-0-134-38260-9
Tony Gaddis
Pearson Publishing, 2016, Fourth Edition

MATLAB for Engineers. ISBN 978-0-134-58964-0
Holly Moore
Pearson Publishing, 2017, Fifth Edition

COREQUISITE

MTH 1554 (Calculus I)

COURSE CONTENTS

VISUAL C# (C SHARP) .NET

Introductory Programming Concepts, Algorithm Design, and the Visual C# .NET Environment
Fundamentals of Event-Driven Programming
Data Types, Variables, and Assignment Statements
Arithmetic Operators and Scope
Decisions and Data Validation
Simplifying Programming through Modularity
Error Handling
Repetitive Structures/Loops
Arrays
Sequential Files
Introductory Database Programming with Data Objects

MATLAB

An introduction to using Matlab for solving problems in Engineering
Using matrices in Matlab, debugging in Matlab, and using and creating functions in Matlab

PROBLEM SOLVING (TENTATIVE)

Uncertainty and Design
Divide and Conquer Techniques in Electronics and Dynamics
Estimating and Predicting Unknowns
Simulation
Noise and Filtering

ABET AND ENGINEERING EDUCATION:

Engineering programs in the United States are accredited by the Accreditation Board for Engineering and Technology (ABET). All engineering students in such accredited programs (including all engineering majors at Oakland University) must demonstrate, before graduation, that they have achieved the following **program outcomes**:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

EGR 141 is part of the *engineering core*, a set of courses taken by all engineering students. The course is an introduction to computer problem solving in engineering. If you are an electrical or computer engineering major this course will give you a solid foundation and background for future courses in your major. If you are a mechanical engineering or industrial engineering major this course will give you basic knowledge of solving problems, developing an algorithm or method to solve a problem, and programming a computer to carry out the method that you created. Almost all products today have small or significant computer programs.

Note that the above ABET program outcomes (a – k) apply to *all* engineering programs – electrical, mechanical, industrial, systems, or computer engineering. This course will contribute to these program outcomes through the following course objectives.

COURSE OBJECTIVES

A student who is successful in EGR 1400 will be able to:

- Solve problems in Engineering and Computer Science (a, b, d, e, h, k)
- Design an algorithm and use Visual C# .NET to develop a program (a, b, c, e, k)
- Use events in the design and implementation of graphical user interfaces (a, b, c, e, k)
- Use forms, buttons, textboxes, radio buttons, and listboxes in Visual C# .NET (a, b, c, e, k)
- Develop Visual C# .NET code for functions, loops, decision structures (if, case) (a, b, c, e, k)
- Use the Visual C# .NET debugger to watch variables and program execution (a, b, c, e, k)
- Use memory and storage properly including variables, arrays, sequential files and a database using Visual C# .NET (a, b, c, e, k)
- Use Matlab Toolbox functions to solve problems (a, b, c, e, k)

PROBLEM-SOLVING EXERCISES

Problem Solving Exercises will be posted on Moodle. The exercises should be handed in at the front of the room before the lecture on the due date given for the exercise. Do not hand in exercises during the lecture. If you come in late, hand in your exercise after class. *Late exercises are not accepted*. Your problem-solving exercises **must be done with one or two other people (a total of two or three people).** If a problem-solving exercise is turned in individually (only one person), ***20 points will be deducted***. Problem-solving will begin Tuesday, January 16th, 2018.

LABORATORY

The laboratory will be held each week starting on Tuesday, January 16th, 2018. Laboratory experiments will be conducted **individually** unless otherwise specified.

The lab must be completed and demonstrated to the lab mentor. The lab mentor will sign the signature page after you have successfully demonstrated your solution. Each lab assignment will specify a set of deliverables, these are the items that you will hand in for credit. The signature page and any other deliverables must be handed in to the lab mentor at the beginning of the next lab period to receive full

credit **unless other arrangements have been made with your lab mentor prior to the due date**. The experiments that will be done this term will be given on Moodle. Specific laboratory procedures will be given in the lab. There will be approximately 10 lab assignments in this course.

When demonstrating your solution, the lab mentor will ask you questions about your solution. Up to sixty percent of your grade will be based on whether or not they are confident that you understand your solution.

EXAMS

There will be two exams during the term and a final exam. There will be ***no*** makeup exams.

GRADING

To earn a grade in this course, a student must earn a passing grade (a 60% or above) in the laboratory as well as in the course. The final grade will be based on the following weights:

Problem-Solving Exercises	12%	(~5 assignments)
Laboratory Experiments	25%	(~10 assignments)
Special Partner Activity (SPA)	3%	
Exam #1	20%	
Exam #2	20%	
Final Exam (Check Registrar's Website)	20%	
	100%	

SPECIAL PARTNER ACTIVITY (SPA)

In order to receive SPA credit, twice during the semester (1% each), you must find someone in the class with whom you have not worked on problem-solving assignments or labs. Go do something – study, go to a movie, hiking, coffee, lunch, whatever. Bring back a photo of this magical interaction with your names written on it to receive credit. Please print the photo, do not email them. Three people who have never worked together will count as two SPA activities at once. SPA credit will be accepted anytime **up to and including the last day of class during the final exam**. In order to receive credit, your SPA activity must be convincing…

ACADEMIC CONDUCT

Problem-Solving Homework: You will be working in groups to complete the problem-solving homework. **You may not consult other groups for solutions.**

Lab Assignments: You may consult with your lab instructor or other students for assistance, however, **you may not copy code, portions of code, or have them write code for you**. You will be expected to be able to answer the questions asked by the laboratory instructor regarding how *you* designed your program. Your lab solution **must be your own work**.

Exams: During an exam, **you must bring picture identification**. Exams are independent assignments that will be completed in class without the consultation of any students or materials. Copying from another student or talking during an exam is prohibited.

The "Academic Conduct Policy" is explained in the Undergraduate catalog. Students suspected of cheating will be referred to the Academic Conduct Committee according to the "Academic Conduct Policy". Any student found responsible for cheating by that committee will receive a 0.0 in the course.

OFFICE HOURS AND CONTACT INFORMATION

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