THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Fundamentals of Engineering for Honors I - Advanced Programming

ENGR 1281.02H

Credit Hours:
5.00 - 5.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture
Lab

Course Description:
Engineering problem solving utilizing computational tools such as Excel and MATLAB; algorithm development; introduction to C++ programming for engineering; hands-on experimentation; modeling; ethics; teamwork; written, oral and visual communications. This variant of the course is intended for students who are advanced in computer programming skills.

Prerequisites and Co-requisites:
Prereq: Honors standing, and enrollment in the College of Engineering; or permission of instructor. Prereq or concur: Math 1151, or 1161.02, or 1181H.

Course Goals / Objectives:

- Develop professional skills for success in engineering, including teamwork; written, oral, and visual communications; and ethics
- Understand basic elements for engineering problem solving including developing algorithms and utilizing tools such as Excel and MATLAB
- Be competent with writing simple C++ programs using basic C++ constructs, declarations and various program control statements for selection and repetition, and file input and output
- Be familiar with C++ functions, arrays, pointers, and C++ classes
- Have an introductory knowledge of a wide range of fundamental engineering tasks and principles gained through homework and hands-on laboratory exercises
- Be motivated towards opportunities within engineering careers and gain an appreciation of the range of engineering disciplines available to them

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Course Topics:

- Course overview.
- Teamwork fundamentals and team working agreements.
- Problem solving fundamentals - Problem types, systems descriptions, SI units, significant digits, understanding analysis vs. design.
- Using spreadsheets for problem solving - Excel spreadsheet structure; equations, operators, array elements; models and systems; mathematical models; plots and charts.
- Ethics for engineers.
- Using MATLAB for problem solving - MATLAB tool/environment; command mode; script files, arrays, and strings; problem solving structure for MATLAB, algorithms, statements and functions; input, output, plotting; systems and mathematical models.
- Using C++ for engineering problem solving - Introduction, simple input and output, variables and assignments, selection statements, repetition and loops, file I/O, functions, arrays, pointers, strings, C++ classes.
- Laboratory exercises drawing from various engineering domains - Fundamental engineering concepts; hands-on experiences with measurement and instrumentation; modeling of engineering systems: collection and analysis of data; reporting of results.

Designation:

Required