MONTANA STATE UNIVERSITY  
DEPARTMENT OF MECHANICAL ENGINEERING  
EMEC 203 CAE II-MECHANICAL ENGINEERING COMPUTATIONS

Instructor:  
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E-mail: paul.gentile@me.montana.edu  Email only your private questions such as those pertaining to your grade or attendance. Post your questions regarding homework, course subject matter or other general questions in the appropriate discussion board (blog) on D2L rather than sending an email. Course instructor will receive email notifications of your post and will respond so the entire class can review the answer when appropriate. Questions can be posted anonymously and other students can also join the discussion. DO NOT POST SOLUTIONS OR ANSWERS TO HW PROBLEMS. You can sign up to receive email notifications of posts.

Course Web Site:  
https://ecat.montana.edu/

Catalog Description:  
EMEC 203 CAE II-MECHANICAL ENGINEERING COMPUTATIONS  
F,S 2 cr. LEC 1 LAB 1.  
PREREQUISITE: EMEC and ETME majors only, EMEC 103.  
COREQUISITE: M 172 for ME majors; M 166 for MET majors.  
-- Computer methodology, use of various computer software packages in mechanical engineering applications.

Course Schedule:  
Lecture: EMEC 203-001  
Lab: EMEC 203-003  
Semester: Fall 2012  
Time: Thurs. 1410-1500  
Place: ROBH 101

The detailed course schedule is posted on the course website. Check the posted schedule frequently as there may be changes in assigned problems, corrections to assigned problems, or additional information that may help you solve a particular problem.

Computer and Laboratory Usage  
This course requires students to use a computer and computer software (EXCEL, MathCAD, MATLAB and CAD) to solve assigned homework problems and to take course exams. No drinks or food are permitted in the laboratory.

All student computer labs on campus should now have Excel, Word, Mathcad and Matlab for completing your assignments outside of office hours. For more information on the student labs refer to:  
http://studentlabs.montana.edu/.

MathCAD 15.0 is provided with the purchase of your textbooks. Excel and MATLAB can be purchased at the bookstore for significantly discounted rates and installed on a personal computer. The student versions have virtually all the same features as the full professional versions!

Course Objectives:  
EMEC 203 gives Mechanical Engineering students exposure to computer software packages typically used in the profession including MathCAD, MATLAB, Excel and CAD. EMEC 203 introduces students to engineering
computations for later courses in the curriculum which commonly require the use of one or all of these programs. Typically the level of expertise required in advanced applications will be beyond that obtained in EMEC 203 but the student will have the skills required to learn the appropriate specialty techniques.

**Course Outcomes:**
Students should, upon completion of this course have a demonstrated:
1. Ability to use the software programs Excel and MathCAD to solve basic engineering type problems.
2. Ability to use the formatting capabilities of Excel and MathCAD to clearly provide information about a problem and its solution.
3. Ability to utilize fundamental MathCAD and MATLAB programming techniques to solve basic engineering type problems.

**Class Format:**
Weekly 50 minute lectures introduce students to engineering computational techniques, programming logic used by mechanical engineers and the parallels between CAD software and Excel, MathCAD and MATLAB.

Each weekly one hour and 50 minute laboratory session will focus on specific elements of a software application. Lab time will be divided into 2 sections:

Part I: An online quiz will cover course material from the previous week's lab assignment. **The quiz must be completed in the ME computer lab during the scheduled time.** Missed quizzes cannot be made up without a written university excused absence. Quiz make-ups can only be scheduled if you notify the instructor prior with a legitimate reason.

Part II: A short lecture will address new topics. You will then work through tutorials and assignment problems that will be handed in for grading. Completed homework exercises will be due the day prior to the following lab unless otherwise noted. Assignments will be submitted to the appropriate drop box on D2L. Submit late assignments to the late drop box.

**Textbooks:**
The following two texts are **required** for this course:


**Grading:**
Lecture Assignments: 50%
Lab Assignments: 25%
Lab Quizzes: 25%

Late assignments will be deducted 50% and will not be graded if submitted more than 3 days late without a university excused absence. Lowest quiz and assignment grades will be dropped.

A (93-100%);   A- (90-92%)
B+ (87-89%);   B (83-86%)
B (83-86%);   B- (80-82%)
C+ (77-79%);   C (73-76%)
C (73-76%);   C- (70-72%)
D+ (67-70%);   D (63-66%)
D (63-66%);   D- (60-62%)
F (BELOW 60%)
Student Conduct
You are expected to follow student conduct guidelines outlined in the MSU Student Conduct Guidelines (http://www2.montana.edu/policy/student_conduct/).

Course Topics
(Generally multiple topics will be covered in a single class period.)

Excel:
- General formatting of cells, text, and data
- Basic cell calculations, built in functions
- Named and absolute references
- Plotting multiple data sets
- Plot formatting: axes labels, legends, data markers, lines, formatted text
- Numerical integration: trapezoid method
- Slope and intercept functions, and trend lines
- Matrix methods / solving systems of linear equations

MathCAD:
- Basics
- Formatting
- Units
- Built in functions
- User defined functions
- Index and subscript notation
- Lists, vectors, matrices / solution of systems of linear equations
- Plotting: multiple data sets or multiple functions
- Plot formatting
- Index loops
- Root finding using: polyroots(), root(), and Given-Find Solve block
- Symbolic calculation
- Numerical integration: Trapezoid method
- Programming in MathCAD

Matlab:
- Command line / built in functions
- Diary: diary('filename') to save session
- Script files: .m files
- User defined functions: .m files
- Vectors and matrices
- Solving simultaneous equations
- Control statements: for, if–then-else, while
- Plotting data
- Finding roots of an equation
- Numerical integration