San José State University  
Charles W. Davidson College of Engineering  
Department of Mechanical Engineering  
ME 30 Computer Applications  
Section 01 Fall 2013

Instructor: Bryan Burlingame  
Office Location: Engineering 348  
Email: bryan.burlingame@sjsu.edu  
Office Hours: Monday 4:30 – 5:30 PM, or by appointment only  
Class Meeting Information  
Seminar 01 (40540): M 1200-1250 E189  
Lab 02 (44329): Tr 1330-1615 E407  
Lab 03 (40541): Fr 1330-1615 E407  
Lab 04 (49296): Fr 0900-1145 E407  
Lab 05 (49297): Th 1330-1615 E407

Prerequisites: None  
Course Fees: TBD

Web Pages and Messaging  
Copies of the course materials such as the syllabus, informational handouts, etc., may be found on Dr.  
Furman’s website for this course: http://www.engr.sjsu.edu/bjfurman/courses/ME30/ or on the Canvas  
site: https://sjsu.instructure.com/. You are responsible for regularly checking these websites and the  
messaging system through MySJSU (or other communication system as indicated by the instructor) to  
stay on top of deadlines and announcements for the course.

Course Description  
Using a computer to solve engineering problems through programming and the use of engineering  
application procedures. Use of procedural and informational problem solving methods and practices  
applied to software design, application, programming and testing. Lecture 1 hour/lab 3 hours. 2 units.

Course Goals and Learning Objectives  
The goals of this course are to help you:  
- Understand how mechanical and aerospace engineers can and do use computers to solve  
  engineering problems  
- Learn how to solve engineering problems using computational methods  
- Get experience in developing algorithms for effectively solving problems using computers  
- Gain familiarity with several software tools that are widely used by mechanical engineers to solve  
  analytical and numerical problems  
- Prepare for subsequent courses which involve computation to solve engineering problems

Learning Objectives  
The student who successfully completes the course will be able to:  
1. General  
   1.1 Locate course materials using course management and web resources  
   1.2 Explain what the course is about what will be covered  
   1.3 Describe where and how computers are used by mechanical and aerospace engineers (MAEs)  
   1.4 List some of the software commonly used by MAEs  
   1.5 Describe what the major elements of a computer are and what they do conceptually  
   1.6 Explain the focus of the course
2. Problem Solving
2.1 Describe and apply a general method for solving an engineering problem that leads to a computational solution
2.2 Analyze a problem and devise an effective algorithm that can be implemented by a computer by applying specific techniques such as problem decomposition, defining diagrams, data dictionaries, pseudocode, desk checking, etc.

3. Programming Methodology
3.1 Apply the basic concepts of sequence, selection, and repetition in the development of a computational solution to a specific problem
3.2 Write programs that are sufficiently documented so that colleagues can understand their operation

4. Application of Software Tools
4.1 Select and explain your choice of appropriate engineering software among potential candidates to use to solve a specific engineering problem
4.2 Apply correct syntax, grammar, and design patterns to create a functional software program that solves a given problem
4.3 Construct visual graphics using various software tools to effectively analyze and present data
4.4 Write program code to interact with the physical world outside the computer

Texts

Required Textbook

Hardware
Arduino UNO or Duemilanove ($20 - $25 from Amazon)
Spartronics Shield ($25 from ME office)

Software
Go to http://www.softintegration.com/download/register/, and register to download Ch 7.0 Student Edition (it is free). Install it on a computer that you will use for your homework.

References
C Programming
http://www.softintegration.com/products/chstudent/ (web page to download Ch Student Edition)
http://www.softintegration.com/download/software/release/docs/ (Documentation for Ch)
http://www.cs.grinnell.edu/~walker/c/examples/intro.pdf (Annotated C programming examples)

Arduino
http://www.arduino.cc/ (See the links for Reference and Getting Started on the ribbon bar especially)

Excel
http://www.vertex42.com/ExcelArticles/ (Many helpful articles for using Excel)

Matlab/Octave/FreeMat/SciLab
http://www.gnu.org/software/octave/
http://freemat.sourceforge.net/index.html
http://qtoctave.wordpress.com/download/
http://www.scilab.org/

Library Liaison
Our liaison to the University Library is Menxiong Liu <Menxiong.Liu@sjsu.edu>, 408-808-2020. Menxiong can help you make optimum use of information resources available to you through the University Library.

Classroom Protocol
I expect everyone to make their best effort to attend all class sessions and laboratory periods. Please arrive to the classroom or laboratory before the session begins, so that others are not disturbed by your entry after instruction has begun. If you normally keep a cell phone activated and with you, put your cell phone on ‘vibrate’ before you enter the classroom. Having your cell phone ring during class is disruptive, and will not be tolerated.

Dropping and Adding
Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available at http://info.sjsu.edu/home/schedules.html. Information about late drop is available at http://www.sjsu.edu/sac/policies/latedrops/. Students should be aware of the current deadlines and penalties for adding and dropping classes.

Assignments and Grading Policy
Assessment for the purposes of determining your course grade will consist of evaluating your performance on homework assignments, laboratory projects, quizzes and examinations, and a final examination. Quizzes may take place in lecture and/or lab and may be unannounced (so keep up on your reading and studying for this class). Check the ME 30 Course Schedule listed below for links to the homework and laboratory assignments. Unless otherwise specified, homework and lab reports will be due one week after they have been assigned. All of your work must be submitted in both hardcopy form AND in softcopy form (via the Canvas course management system) by the due date. You will not get credit for late assignments. Hardcopy of the homework must be submitted to Dr. Furman in lecture before the lecture begins. Hardcopy of your lab report must be submitted to your laboratory instructor during your lab period. IMPORTANT NOTE! Make it a point to turn in something for every assignment, whether you have completed it or not. The most common cause of failure in this class arises from not turning in assignments.

Weighting of Course Components
HW 20%, Laboratory Projects 40%, Quizzes and Exams 20%, Final Exam 20%

Criteria for Assigning Letter Grades
The scores on you homework, laboratory projects, quizzes and exams, and final examination will be normalized, combined and totaled using the weighting scheme described above. A final letter grade will be determined from your overall performance (percentage) using the following criteria:
A+ Over 100%; A 100 – 93%; A- 92 – 90%; B+ 89 – 87%; B 86 – 83%; B- 82 – 80%; C+ 79 – 77%; C 76 – 72%;
C- 71 – 69%; D+ 68 – 66%; D 65 – 62%; D- 61 – 59%; F <58%. Note: MAE must earn at least a grade of C- to pass the course.

The midterm examination will be given in the Laboratory sections during the week of October 14, 2013. You must attend your lab section that week in order to take the exam.

The final examination for the course will be Thursday, December 12, from 0945 - 1200 in E189.

University Policies
Academic Integrity

Your commitment as a student to learning is evidenced by your enrollment at San José State University. The University’s Academic Integrity policy, located at http://www.sjsu.edu/senate/S07-2.htm, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Policy S07-2 requires approval of instructors. Plagiarism is defined as, the use of another person’s original (not common-knowledge) work without acknowledging its source.¹ Thus plagiarism includes, but is not limited to²:

- copying in whole or in part, a picture, diagram, graph, figure, program code, algorithm, etc. and using it in your work without citing its source
- using exact words or unique phrases from somewhere without acknowledgement
- putting your name on a report, homework, or other assignment that was done by someone else

Students are expected to familiarize themselves with how to avoid plagiarism. Several helpful resources can be found at:

http://www.stanford.edu/dept/vpsa/judicialaffairs/students/plagiarism.sources.htm

I encourage students to collaborate on assignments, such as homework and lab reports, however what this means is that you can work together to decide on solution strategies, discuss what should be included in reports and how they should be organized, etc., but you may not copy answers in whole or in part (this includes program code), and you must put together your own lab reports. We will be using Turnitin.com to check the originality of your submissions, so do your own work.

Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The website for Student Conduct and Ethical Development is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

SJSU Senate Policy S12-3 - Federal Regulation of the definition of the credit hour:

---


Success in this course is based on the expectation that a student will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week with one of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica, etc. Other course structures will have equivalent workload expectations as described in the syllabus. [Thus, for this class, it is expected that you will spend at least two hours outside of class working on homework, lab work, test preparation, etc.]

Campus Policy in Compliance with the American Disabilities Act
If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

Student Technology Resources
Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and on the 2nd floor of the Student Union. Additional computer labs are available in the Engineering Building in E390, and for MAE students, in E213 and E215. Computers are also available in the Martin Luther King Library (see: http://www.sjlibrary.org/services/computers/index.htm).

SJSU Writing Center
The SJSU Writing Center is located in Room 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The Writing Center website is located at http://www.sjsu.edu/writingcenter/.

ME 30 Course Schedule
The schedule below is a reasonable estimate of what will take place in the course and when. Check your email daily and the course website for alerts regarding changes to the schedule.

Legend:
TD: n-m => C Programming for Engineering custom text (Tan & D’Orazio), Chapter n through Chapter m

Notes
1. Each reading assignment shown in the table should be completed prior to the lecture for the week in which the assignment is listed. In other words, read the assigned chapters before the next lecture! Doing so will help prepare you for lecture and will help you maximize your learning efficiency. When you read, summarize the important points, and jot down any questions that you have. Bring your questions with you to the lecture, and please ask your instructor about them if they are not answered during the course of the lecture.

   Make sure that you go over the Exercises at the end of every lesson in the text. These will help solidify your understanding of the concepts presented.

2. Following each lecture, I highly recommend that you review any notes you took in lecture along with the notes that you took from reading. Read back through your notes, and fill in any gaps that you may have missed or that became clearer from the lecture. Write down any questions you have in the margins of your notes. Be sure to come to office hours, or ask about your questions in class.

3. Note that hardcopy of the homework is generally due to the instructor at the beginning of the lecture one week after it is assigned. Unless otherwise specified, you will be expected to ALSO turn in a softcopy of your homework electronically using Canvas by the deadline indicated in the associated Dropbox. Both hardcopy and softcopy must be submitted, or you will not get credit for the assignment. Pay careful attention to the deadlines for when your work must be submitted in
D2L, because after the deadline passes, you will be unable to submit, and therefore you will not get credit assignments. Do not wait to the very last minute before the deadline, because slight differences between your clock setting and the server running the course management software may result in you not meeting the deadline. When you complete an assignment, I highly recommend that you first upload it to D2L, and then print out the hardcopy. Following this order will help you not forget to upload the softcopy version.

4. Bring some kind of data storage device with you to each laboratory session or plan to email a copy of your work to yourself, so that you will have a way to save your work. The hard drives on the computers are frequently refreshed, so do not rely on them to save your work from session to session.

**ME 30 Course Schedule** (may be subject to change, so check back throughout the semester!)

<table>
<thead>
<tr>
<th>Wk.</th>
<th>Date</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>8/26</td>
<td>Enrollment, course organization, overview of computers and programming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning obj. 1</td>
</tr>
</tbody>
</table>
|     |      | Reading TD: 1.1 – 1.6  
|     |      | http://www.engr.sjsu.edu/bjfarman/courses/ME30/ME30pdf/Notes_on_Data_Types.pdf  
|     |      | Lab Project 1: Introduction to course tools |
|     |      | Assignment Homework 1 and Questionnaire (don’t forget to include a picture of yourself in the Questionnaire)  
|     |      | Enroll in the Piazza shell for ME 30. (Visit https://piazza.com/sjsu/fall2013/me30/home)  
|     |      | Homework 1 and Questionnaire due on 09/04. Hardcopy in lecture, and softcopy via D2L. |
| 3   | 9/3  | (Labor Day – Campus Closed) Operators, Binary Arithmetic, & Introduction to Spreadsheets |
|     |      | Learning obj. 2, 3, 4 |
|     |      | Reading http://www.egr.msu.edu/~lira/spreadsheets.pdf  
|     |      | Lab Project 2: Excel – part 1 |
|     |      | Assignment Check Canvas  
|     |      | Due In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |
| 4   | 9/9  | Using Spreadsheets for Engineering Computation – Part 1 |
|     |      | Learning obj. 2, 3, 4 |
|     |      | Reading http://www.egr.msu.edu/~lira/spreadsheets.pdf  
|     |      | Lab Project 3: Excel – part 2 |
|     |      | Assignment Check Canvas  
|     |      | Due In lecture: Homework (hard copy). Softcopy via Canvas.  
|     |      | In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |
| 5   | 9/16 | Using Spreadsheets For Engineering Computation – Part 2 |
|     |      | Learning obj. 2, 3, 4 |
|     |      | Reading http://faculty.virginia.edu/ribando/modules/xls/VBAPrimer.pdf  
|     |      | Lab Project 4: Excel – part 3 |
|     |      | Assignment Check Canvas  
|     |      | Due In lecture: Homework (hard copy). Softcopy via Canvas.  
<p>|     |      | In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Matlab for Engineering Computation – Part 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Learning obj.</td>
<td>2, 3, 4</td>
</tr>
<tr>
<td></td>
<td>Reading</td>
<td><a href="http://www.mathworks.com/access/helpdesk/help/techdoc/learn_matlab/bqr_2pl.html">http://www.mathworks.com/access/helpdesk/help/techdoc/learn_matlab/bqr_2pl.html</a>; Ch: 23</td>
</tr>
<tr>
<td></td>
<td>Lab</td>
<td>Project 5: Matlab – part 1</td>
</tr>
<tr>
<td></td>
<td>Assignment</td>
<td>Check Canvas</td>
</tr>
</tbody>
</table>
|   | Due           | In lecture: Homework (hard copy). Softcopy via Canvas.  
|   |              | In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Matlab for Engineering Computation – Part 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Learning obj.</td>
<td>2, 3, 4</td>
</tr>
<tr>
<td></td>
<td>Reading</td>
<td><a href="http://www.mathtools.net/MATLAB/Academic_Curricula/General_Interest/MATLAB_Tutorials/index.html">http://www.mathtools.net/MATLAB/Academic_Curricula/General_Interest/MATLAB_Tutorials/index.html</a></td>
</tr>
<tr>
<td></td>
<td>Lab</td>
<td>Project 6: Matlab – part 2</td>
</tr>
<tr>
<td></td>
<td>Assignment</td>
<td>Check Canvas</td>
</tr>
</tbody>
</table>
|   | Due           | In lecture: Homework (hard copy). Softcopy via Canvas.  
<p>|   |              | In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Learning obj.</th>
<th>Reading</th>
<th>Lab</th>
<th>Assignment</th>
<th>Due</th>
</tr>
</thead>
</table>
| 8 10/7 | Introduction to Algorithms | 2, 3, 4.2 | TD: 1.7 – 1.9, 2 and 3  
*Problem Solving And Program Design* (http://www.framingham.edu/~dkeil/keil-johnson.pdf) Pay special attention to the *form* of the control structures and how they are represented in pseudocode.  
http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Algorithms.pdf  
http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_var_names.pdf  
http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Data_Types.pdf | Project 7: Algorithm development and introduction to C | Check Canvas | Homework 1 and Questionnaire softcopy via D2L. (Turn in hardcopy in lecture)  
In laboratory: report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |
| 9 10/14 | The General Form Of A C Program and Introduction to Microcontrollers - *Midterm Exam in Lab this week* | 2, 3, 4.2 | TD: 2 and 3  
*Problem Solving And Program Design* (http://www.framingham.edu/~dkeil/keil-johnson.pdf) Pay special attention to the *form* of the control structures and how they are represented in pseudocode.  
http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Algorithms.pdf  
http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_var_names.pdf  
http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Data_Types.pdf | Project 8: Algorithm development and introduction to C | Check Canvas | Homework 1 and Questionnaire softcopy via D2L. (Turn in hardcopy in lecture)  
In laboratory: report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |
| 10 10/21 | Output: Changing the world outside of the program | 2, 3, 4.2, 4.4 | http://www.tigoe.net/blog/category/physicalcomputing/176/ EXPLORE a few themes that look interesting  
Optional  
In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |
| 11 10/28 | Input: Entering data into a C program and influencing a Microcontroller | 2, 3, 4.2, 4.4 | http://www.arduino.cc/playground/uploads/Main/arduino_notebook_v1-1.pdf  
In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas. |
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Learning obj.</th>
<th>Reading</th>
<th>Lab</th>
<th>Assignment</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/4</td>
<td>Selection Structures and Repetition (for loops)</td>
<td>2, 3, 4.2</td>
<td>TD: 4.1 – 4.6 <a href="http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Algorithms.pdf">http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Algorithms.pdf</a> (Note the forms for how to express a selection structure in pseudocode.)</td>
<td>Project 11: Selection</td>
<td>Check Canvas</td>
<td>In lecture: Homework 2 hard copy. Softcopy via Canvas. In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas.</td>
</tr>
<tr>
<td>11/11</td>
<td>Repetition Structures (while loops) and Files</td>
<td>2, 3, 4.2</td>
<td>TD: 4.7-4.8 <a href="http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Algorithms.pdf">http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Algorithms.pdf</a> (Note the forms for how to express a repetition structure in pseudocode.)</td>
<td>Project 12: Repetition structures</td>
<td>Check Canvas</td>
<td>In lecture: Homework (hard copy). Softcopy via Canvas. In laboratory: Report for the previous week’s Lab Project (hard copy). Softcopy via Canvas.</td>
</tr>
<tr>
<td>12/02</td>
<td>Pointers and Arrays Part 2 – No lab this week</td>
<td>2, 3, 4.2</td>
<td>TD: 7</td>
<td>Project 15: Strings</td>
<td>Check Canvas</td>
<td>In lecture: Homework (hard copy). Softcopy via Canvas.</td>
</tr>
<tr>
<td>Date</td>
<td>12/09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topic</td>
<td>Pointers and Arrays Part 3 &amp; Final Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning obj.</td>
<td>2, 3, 4.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>TD: 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment</td>
<td>Check Canvas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due</td>
<td>In lecture: Report for the previous two week’s Lab Project (hard copy). Softcopy via Canvas. FINAL EXAM on DECEMBER 12th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>