

**San José State University**  
**College of Engineering/Mechanical Engineering Department**  
**ME30, Computer Applications, Fall 2017**

**Course and Contact Information**

<b>Instructor:</b>	Bryan Burlingame
<b>Office Location:</b>	TBD
<b>Email:</b>	fall2017@me30.org
<b>Office Hours:</b>	TBD
<b>Class Days/Time:</b>	Wednesday 1200 – 1250
<b>Classroom:</b>	BBC 004

**Course Format**

**Technology Requirements**

As a technology intensive course, ME30 requires regular access to the Internet and access to a personal computer. Access to a computer is required and instruction will primarily target the Microsoft Windows Operating System, though some tutorials will be provided for the Apple Macintosh as well. Students with experience in Linux are welcome to utilize that platform, though less technical support will be available.

For students without a personal computer, the Mechanical Engineering department has a computer lab available to Mechanical Engineering students in Eng 213.

ME30 will utilize the following programs:

- Microsoft Visual Studio (though any C compiler may be used)
  - Arduino IDE for Visual Studio
- Mathworks MatLab
  - Arduino Support for MatLab
- Microsoft Visio
- Microsoft Word
- Microsoft Excel
- Arduino Integrated Development Environment (IDE)

Each student will be required to obtain a Spartronics Lab Kit available from EduShields

**Faculty Web Page and Messaging**

Course material, such as the syllabus, handouts, copies of the slides, etc. may be found on <http://me30.org>. Additional handouts and useful information may be found on Dr. Furman's website for this course at <http://www.engr.sjsu.edu/bjfurman/courses/ME30/>. Assignments shall be turned into Canvas, <http://sjsu.instructure.com>. Course announcements will be distributed from the Canvas system. You are required to check me30.org and Canvas regularly to keep abreast of the course's progress.

## 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

## Required Texts/Readings

### Textbook

Programming in C, fourth edition. ISBN 978-0-321-77641-9, Kochan, Stephen G. (2014). Sam Publishing, Indianapolis, Indiana Other Readings. There will be weekly readings from the text and regular assignments sourced from the textbook.

### Additional References

<http://www.cplusplus.com/> (Excellent online language reference)

<http://www.gnu.org/s/gnu-c-manual/gnu-c-manual.html> (The GNU C Reference Manual)

Afzal, A. (1999) *Pure C programming*, Prentice-Hall, New Jersey.

Cheng, Harry H. (2010). *C for Engineers and Scientists: An Interpretive Approach*, McGraw-Hill, New York. ISBN 978-0073376059

Darnell, P. A. & Margolis, P. E. (1996) *C, a software engineering approach*, 3<sup>rd</sup> ed., Springer, New York.

Kernighan, B. W. & Ritchie, D. M. (1978) *The C programming language*, Prentice-Hall, New Jersey.

### Software (availability)

- Visual Studio Community Edition (<https://www.visualstudio.com/en-us/products/visual-studio-community-vs.aspx>)
- Microsoft Visio (<http://dreamspark.com>)
- Arduino IDE (<https://www.arduino.cc/>)
- Arduino IDE for Visual Studio (<https://visualstudiogallery.msdn.microsoft.com/069a905d-387d-4415-bc37-665a5ac9caba>)
- MatLab (<http://mathworks.com>)
- Microsoft Excel (<http://its.sjsu.edu/services/software/microsoft-students/index.html>)

### Library Liaison

Our liaison to the University Library is Linda Crotty, [linda.crotty@sjsu.edu](mailto:linda.crotty@sjsu.edu)

Ms. Crotty can help you make optimum use of information resources available to you through the University Library. 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 Mr. Burlingame 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

Homework & Laboratory Projects 50%, Quizzes and Exams 50%.

Students who demonstrate no competency with the course material during the final presentation (corresponding to a score of 0) will receive a failing grade in the course. Failing to participate in the final presentation at the assigned time is an implicit demonstration of lack of competency.

## Criteria for Assigning Letter Grades

The scores on your 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 – 88%; B 86 – 83%; B- 82 – 80%; C+ 79 – 78%; 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 in or around week eight of the semester.

## Final Evaluation

A final project will be presented to the instructor on the day scheduled by the University for the Final Examination for this course.

**The final presentation will be scheduled on Tuesday, December 19**

## From the University:

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”

Additional information is available here: Office of Graduate and Undergraduate Programs’ [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

## 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, and you will be asked to leave.

## 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 University Policies (Required)**

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs’ [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>”

## 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](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.*<sup>1</sup> Thus plagiarism includes, but is not limited to<sup>2</sup>:

- 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](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.

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<sup>1</sup> Definition adapted from "Defining and Avoiding Plagiarism: The WPA Statement on Best Practices," <http://www.ilstu.edu/~ddhesse/wpa/positions/WPAplagiarism.pdf>; and "What is Plagiarism?," <http://www.stanford.edu/dept/vpsa/judicialaffairs/students/plagiarism.sources.htm>.

<sup>2</sup> Adapted from, "Avoiding Plagiarism," [http://owl.english.purdue.edu/handouts/research/r\\_plagiar.html](http://owl.english.purdue.edu/handouts/research/r_plagiar.html).

## Student Technology Resources

Computer labs for student use are available in the Academic Success Center located on the 1<sup>st</sup> floor of Clark Hall and on the 2<sup>nd</sup> 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:

**SK: n-m** => Programming in C (Stephen G. Kochan), Chapter **n** through Chapter **m**

**SK: n-m (x - y)** => Programming in C (Stephen G. Kochan), Chapter **n** through Chapter **m**, pages x - y

### 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!)

Wk.	Date	Subject
1	08/23	Enrollment, course organization, overview of computers and programming, data types
Learning obj.		1
Reading		SK: 1 - 3
Lab		Project 1: Introduction to course tools
Assignment		Homework 1 and Questionnaire (don't forget to include a picture of yourself in the Questionnaire) Homework 1 and Questionnaire due on 02/10. Hardcopy in lecture, and softcopy via Canvas.
2	08/30	Operators, Binary Logic, Boolean Logic, Sequential Logic
Learning obj.		2, 3, 4
Reading		SK: 4, 5, 11 (to page 291)
Lab		Project 2
Assignment		Check Canvas
Due		In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.
3	09/06	The General Form of a C Program, General and as applied to Arduino
Learning obj.		2, 3, 4
Reading		<a href="https://www.arduino.cc/en/Guide/HomePage">https://www.arduino.cc/en/Guide/HomePage</a> <i>Problem Solving And Program Design</i> ( <a href="http://www.framingham.edu/~dkeil/keil-johnson.pdf">http://www.framingham.edu/~dkeil/keil-johnson.pdf</a> ) Pay special attention to the <u>form</u> of the control structures and how they are represented in pseudocode. <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> <a href="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_var_names.pdf</a> <a href="http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Data_Types.pdf">http://www.engr.sjsu.edu/bjfurman/courses/ME30/ME30pdf/Notes_on_Data_Types.pdf</a> <a href="http://www.arduino.cc/playground/uploads/Main/arduino_notebook_v1-1.pdf">http://www.arduino.cc/playground/uploads/Main/arduino_notebook_v1-1.pdf</a>
Lab		Project 3
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.
4	09/13	Decision & Looping Logic
Learning obj.		2, 3, 4
Reading		SK: 15 (pages 343 – 362)
Lab		Project 4
Assignment		Check Canvas
Due		In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.
5	09/20	Input/Output in C
Learning obj.		2, 3, 4
Reading		SK: 6, 7, 9
Lab		Project 5
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.

6	09/27	<b>Arrays, Strings and Modular Programming in C</b>
Learning obj.	2, 3, 4	
Reading	SK: 15 (362 – end of chapter)	
Lab	Project 6:	
Assignment	Check Canvas	
Due	In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.	
7	10/04	<b>Modular Programming (con't) &amp; Midterm Review</b>
Learning obj.	2, 3, 4.2	
Reading	SK: 3, 4	
Lab	Project 7:	
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.	
8	10/11	<b>Digital vs Analog Signals</b>
Learning obj.	2, 3, 4.2	
Reading	SK: 16 (346 – 359) <a href="http://www.arduino.cc/playground/uploads/Main/arduino_notebook_v1-1.pdf">http://www.arduino.cc/playground/uploads/Main/arduino_notebook_v1-1.pdf</a>	
Lab	Midterm	
Assignment	Check Canvas	
Due	In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.	
9	10/18	<b>File I/O</b>
Learning obj.	2, 3, 4.2, 4.4	
Reading	SK: 10 <a href="http://www.tigoe.net/blog/category/physicalcomputing/176/">http://www.tigoe.net/blog/category/physicalcomputing/176/</a> EXPLORE a few themes that look interesting <u>Optional</u> <a href="http://ahmedriaz.com/mind/esketching4designers/">http://ahmedriaz.com/mind/esketching4designers/</a> Lots of links to Arduino-related and other embedded-related sites	
Lab	Project 8:	
Assignment	Check Canvas	
Due	In lecture: Homework (hard copy). Softcopy via Canvas.	
10	10/25	<b>Pointers</b>
Learning obj.	2, 3, 4.2, 4.4	
Viewing	SK 10	
Lab	Project 9:	
Assignment	Check Canvas	
Due	In laboratory: Report for the previous two week's Lab Project (hard copy). Softcopy via Canvas.	

11	11/01	<b>Introduction to MatLab</b>
Learning obj.	2, 3, 4.2	
Viewing	<a href="https://www.mathworks.com/videos/introduction-to-matlab-81592.html?s_tid=srchtitle">https://www.mathworks.com/videos/introduction-to-matlab-81592.html?s_tid=srchtitle</a> <a href="https://www.mathworks.com/videos/introduction-to-data-analytics-with-matlab-120994.html">https://www.mathworks.com/videos/introduction-to-data-analytics-with-matlab-120994.html</a>	
Lab	Project 10:	
Assignment	Check Canvas	
Due	In lecture: Homework 2 hard copy. Softcopy via Canvas. In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.	
12	11/08	<b>Graphing in MatLab &amp; Presenting Graphical Information</b>
Learning obj.	2, 3, 4.2, 4.4	
Reading	Start here: <a href="https://www.mathworks.com/help/matlab/matlab_prog/loop-control-statements.html">https://www.mathworks.com/help/matlab/matlab_prog/loop-control-statements.html</a> and explore the MatLab documentation	
Lab	Project 11:	
Assignment	Check Canvas	
Due	.	
13	11/15	<b>Decisions &amp; Loops in MatLab</b>
Learning obj.	2, 3, 4.2	
Reading	Start here: <a href="http://www.mathworks.com/help/matlab/ref/xlsread.html">http://www.mathworks.com/help/matlab/ref/xlsread.html</a> and explore the MatLab documentation	
Lab	Project 12:	
Assignment	Check Canvas	
Due	In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.	
14	11/22	<b>Thanksgiving Week – No Lecture</b>
Learning obj.	2, 3, 4.2	
Reading		
Lab	Project 13	
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.	
15	11/29	<b>Importing data into MatLab and Tool chains – No Lab on Tuesday</b>
Learnin0g obj.	2, 3, 4.2	
Reading		
Lab	Project 14	
Assignment	Check Canvas	
Due	In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.	
Due	In lecture: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas.	
16	12/06	<b>Final Review</b>
Learning obj.	2, 3, 4.2	
Due	In lecture: Homework (hard copy). Softcopy via Canvas. In laboratory: Report for the previous week's Lab Project (hard copy). Softcopy via Canvas. <b>FINAL Presentation on December 19th</b>	