

San José State University
College of Science / Department of Computer Science
CS-160, Software Engineering, Section 6, Fall, 2016

Course and Contact Information

Instructor:	Robert Bruce
Office Location:	DH-282
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Email:	Robert.Bruce@sjsu.edu
Office Hours:	Monday and Wednesday, 4pm-5pm or by appointment.
Class Days/Time:	Monday and Wednesday, 7:30pm-8:45pm
Classroom:	SCI-311
Prerequisites:	CS-146 and CS-151 (with a grade of "C-" or better in each); CS-100W (with a grade of "C" or better) or instructor consent.

Course Format

Technology Intensive, Hybrid, and Online Courses

This class is technology intensive. You will need an Intel x86 or compatible laptop or desktop machine. We will be working in a Linux development environment. You will be using command line tools such as Make, gcc, etc. You will be creating and managing SQL tables in Postgres. You will also be creating static and dynamic web pages using the Apache web server. You will need an internet connection to access materials on the course website and Canvas. I will be providing a 120GB solid state drive configured with Linux for you with a USB3.0 or two USB2.0 interfaces. Generally, Mac notebooks and Windows-based notebooks work fine. The most difficult task is getting the external Linux drive to boot into secure boot environments. All software and software development tools we will be using are open source. You may use a variety of languages for your programming project including Java, C, C++, PHP, Perl, Python, etc.

Faculty Web Page and MYSJSU Messaging

All course materials (handouts, assignments, lectures, etc.) will be posted to my course web site at: <http://www.cs.sjsu.edu/~bruce/>. You will be using Canvas to submit your programs and receive feedback/grades on your assignments and exams. You are responsible for regularly checking with the email messaging system through MySJSU at <http://my.sjsu.edu> to learn of any updates.

Course Description

Software engineering principles, software process and process models, requirements elicitation and analysis, design, configuration management, quality control, project planning, social and ethical issues. Required team-based software development, including written requirements specification and design documentation, oral presentation, and tool use. Prerequisite: CS 146, CS 151 (with a grade of "C-" or better in each); CS 100W (with a grade of "C" or better) or instructor consent. Computer Science and Software Engineering Majors only.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. Course Learning outcome: Design a scalable, relational database schema to support a computer vision face detection pipeline.
2. Course Learning outcome: Apply the Postgres application programming interface in software applications.
3. Course Learning outcome: Use the Active Appearance Modelling (AAM) algorithm from OpenFace to locate facial features.
4. Course Learning outcome: Use Delaunay triangulation from the OpenCV library to create a face mesh.
5. Course Learning outcome: Use the FFMPEG library to convert video into a series of still images.
6. Course Learning outcome: Use the FFMPEG library to extract video metadata information (frames per second, number of frames, etc.).
7. Course Learning outcome: Use named pipes, fork(), and exec() to implement inter-process communication in the face detection pipeline.
8. Course Learning outcome: Create dynamically-driven web page content using Apache.
9. Course Learning outcome: Apply software engineering principles through the entire development lifecycle from design, implementation, testing, release, and maintenance.

Required Texts/Readings

Textbook

Beginning Software Engineering by Rod Stephens. ISBN-13: 978-1118969144.

I've put three personal copies of this book on course reserves for twenty-four hour checkout from the SJSU King Library. Alternately, you can purchase this book from an online bookstore such as Amazon, Barnes and Noble, etc.

Other Readings (optional)

PostgreSQL: Up and Running by Regina Obe and Leo Hsu.

This book is available electronically from the SJSU King Library at <http://libaccess.sjlibrary.org/login?url=http://proquest.safaribooksonline.com/?uiCode=Incommon-member@co.calstate.edu&xmlId=9781449373184>.

This book is also available electronically from San Jose Public Library at <http://0-proquest.safaribooksonline.com.catalog.sjlibrary.org/?uiCode=califa&xmlId=9781449373184>

Learning OpenCV: Computer Vision with the OpenCV Library by Gary Bradski and Adrian Kaehler.

This book is available electronically from the SJSU King Library at <http://sjsu.ebib.com/patron/FullRecord.aspx?p=443167>

Advanced programming in the UNIX environment by W. Richard Stevens and Stephen A. Rago.

This book is available electronically from the SJSU King Library at <http://libaccess.sjlibrary.org/login?url=http://proquest.safaribooksonline.com/?uiCode=&xmlId=9780321638014>.

This book is also available electronically from San Jose Public Library at <http://0-proquest.safaribooksonline.com.catalog.sjlibrary.org/?uiCode=califa&xmlId=9780321638014>

Other technology requirements / equipment / material

You will be provided with a 120GB solid state drive with a USB3.1 interface. This drive has been pre-configured with Linux Mint in a graphical X-windows environment along with a host of GNU development and programming utilities, a Postres database server, the OpenCV library, OpenFace library, and FFMPEG library. This drive was specifically created for this class with all the tools necessary to create a computer vision pipeline.

Library Liaison

Linda Crotty, linda.crotty@sjsu.edu

Course Requirements and Assignments

There are six programming assignments in this course. The programming assignments are designed as building blocks which lead to a culminating final project: web-based, computer vision face detection system. Detailed instructions and specifications for each programming assignment will be posted to my SJSU faculty webpages at <http://www.cs.sjsu.edu/~bruce/> with adequate time for students to complete each assignment by the assignment deadline. Students are strongly encouraged to ask the instructor for clarification on each programming assignment specification. There will be an in-class oral presentation and demonstration of the final project as well as a written final project report. Lastly, there will be on midterm and one final exam.

Final Examination or Evaluation

There will be a final exam on **Wednesday, December 14 in SCI-311 at 7:45PM**. The final exam will be based on in-class lecture material and material from our textbook. The final exam will be comprised of 15 multiple choice questions. This is a closed note, closed-book exam. The final exam is worth 15% of your overall grade.

Grading Information

Each programming assignments will include detailed specifications. The programming assignments will be graded collectively as a group. This means everyone in the group gets the same grade for each programming assignment. I expect each of your programs to compile (if applicable) or interpret (where applicable) without syntax errors or logic errors. Points will be deducted for programs that do not meet the specifications and/or programs containing syntax errors.

The programming assignments will be due upon completion of the project on **December 7, 2016**. Only one member of the group needs to submit the programming assignments to Canvas. All members of the group will receive the same grade for these assignments.

The final project oral presentation is an opportunity to discuss your project and demonstrate it to the class. Each member of the group is expected to speak for approximately 5 minutes about their contributions on the project. After each member of the group has spoken, the entire group will present a demonstration of the project itself (i.e. run the project). The group presentation will be no more than 10 minutes.

Each member of the project will individually write and submit a final project report. This is an individual assignment, not a group assignment. The final project report should include a title page followed by a two-page report. The report should include the following:

- Your contributions to the project.
- An overall assessment of the success and failures (if any) on the project. This is an opportunity to discuss time management issues, communication issues among team members, etc. It's an opportunity for you to reflect upon the project and how well the team performed.

Incomplete assignments

Points will be deducted for incomplete or partially working solutions. Point penalties vary with each assignment but are listed in the programming project assignment.

Makeup Exams

Exams are closed note and closed book. Exams must be your own work. Makeup exams will only be given in extraordinary circumstances with instructor approval; instructor **MUST** be notified in advance.

Grade breakdown

ASSIGNMENT OR EXAM	POINT VALUE
Programming Project 1: Database schema [*]	5
Programming Project 2: Web-based user login [*]	10
Programming Project 3: Extract still images from video [*]	10
Programming Project 4: Determine facial landmarks [*]	10
Programming Project 5: Track eye pupils [*]	10
Programming Project 6: Web-based display results [*]	10
Final Project Oral Presentation ^{**}	5
Final Project Report ^{**}	10
Midterm Exam ^{**}	15
Final Exam ^{**}	15
TOTAL POINTS	100

^{*} Graded as a group (each member of the group gets same grade)

^{**} Graded as an individual

Grading Scale:

Percent range	Grade
97% to 100% inclusive	A+
93% to 96% inclusive	A
90% to 92% inclusive	A-
87% to 89% inclusive	B+
83% to 86% inclusive	B
80% to 82% inclusive	B-
77% to 79% inclusive	C+
73% to 76% inclusive	C
70% to 72% inclusive	C-
67% to 69% inclusive	D+
63% to 66% inclusive	D
60% to 62% inclusive	D-
Below 60%	F

Classroom Protocol

Regular class attendance is highly recommended. Students are responsible for knowing all materials covered through in-class lectures and assigned readings. Please be mindful of fellow students and the instructor by not talking on mobile phones during instruction. Students are expected to leave the class quietly in the event they must use their mobile phones.

University Policies

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/>

CS-160 / Software Engineering, Fall 2016, Course Schedule

List the agenda for the semester including when and where the final exam will be held. Indicate the schedule is subject to change with fair notice and how the notice will be made available.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	Wednesday, August 24	Lecture: Class overview and objectives <i>Form project teams</i>
1	Monday, August 29	Lecture: What is software engineering? Readings: Chapter 1 of <i>Beginning Software Engineering</i>
2	Wednesday, August 31	Lecture: Postgres RDBMS (Relational Database Management System)
2	Monday, September 5	CAMPUS CLOSED. No office hours today. <i>Note: Last day to drop course is September 6!</i>
3	Wednesday, September 7	Lecture: Document management Readings: Chapter 2 of <i>Beginning Software Engineering</i>
3	Monday, September 12	Lecture: FFMPEG library and systems programming tools
4	Wednesday, September 14	Lecture: Project management Readings: Chapter 3 of <i>Beginning Software Engineering</i>
4	Monday, September 19	Lecture: Processing FORM data from an HTTP POST
5	Wednesday, September 21	Lecture: Requirement gathering Readings: Chapter 4 of <i>Beginning Software Engineering</i>
5	Monday, September 26	<i>Conceptual design reviews and prototype demos</i>
6	Wednesday, September 28	<i>Conceptual design reviews and prototype demos</i>
6	Monday, October 3	Lecture: High and low level design Readings: Chapters 5 and 6 of <i>Beginning Software Engineering</i>
7	Wednesday, October 5	Lecture: Secure session management with HTTP
7	Monday, October 10	Lecture: Programming the Postgres C API (Application Programmer Interface)
8	Wednesday, October 12	MIDTERM EXAM

Week	Date	Topics, Readings, Assignments, Deadlines
8	Monday, October 17	<i>Application design reviews</i>
9	Wednesday, October 19	<i>Application design reviews</i>
9	Monday, October 24	Lecture: Development Readings: Chapter 7 of <i>Beginning Software Engineering</i>
10	Wednesday, October 26	Lecture: Active Shape Modelling and Appearance Modelling
10	Monday, October 31	Lecture: Testing Readings: Chapter 8 of <i>Beginning Software Engineering</i>
11	Wednesday, November 2	Lecture: Eye pupil tracking
11	Monday, November 7	Lecture: Deployment, Metrics, and Maintenance Readings: Chapters 9, 10, and 11 of <i>Beginning Software Engineering</i>
12	Wednesday, November 9	Lecture: Drawing with OpenCV
12	Monday, November 14	Lecture: Delaunay triangles
13	Wednesday, November 16	<i>Code reviews</i>
13	Monday, November 21	<i>Code reviews</i>
14	Wednesday, November 23	NO LECTURE TODAY. I will be in my office during office hours.
14	Monday, November 28	Lecture: Predictive models Readings: Chapter 12 of <i>Beginning Software Engineering</i>
15	Wednesday, November 30	Lecture: Iterative models Readings Chapter 13 of <i>Beginning Software Engineering</i>
15	Monday, December 5	Lecture: RAD Readings Chapter 14 of <i>Beginning Software Engineering</i>
16	Wednesday, December 7	<i>Application demonstration</i> DUE: Programming Assignment 1 DUE: Programming Assignment 2 DUE: Programming Assignment 3 DUE: Programming Assignment 4 DUE: Programming Assignment 5 DUE: Programming Assignment 6

Week	Date	Topics, Readings, Assignments, Deadlines
16	Monday, December 12	<i>Application demonstration</i> DUE: Final Project report
Final Exam	Wednesday, December 14	SCI-311 at 7:45PM