San José State University
College of Science / Department of Computer Science
CS-160, Software Engineering, Section 1, Spring 2018

Course and Contact Information

Instructor: Robert Bruce

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Office Hours: Monday and Wednesday, 1pm-2pm

Class Days/Time: Monday and Wednesday, 4:30pm-5:54pm

Classroom: Science, 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. 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

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Leaning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the 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 Goals

Course Learning Outcomes (CLO)

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

1. *Design a scalable, relational database schema to support a computer vision face detection pipeline.*

2. *Apply the Postgres application programming interface in software applications.*

3. *Use the Active Appearance Modelling (AAM) algorithm from OpenFace to locate facial features.*

4. *Use Delaunay triangulation from the OpenCV library to create a face mesh.*

5. *Use the FFMPEG library to convert video into a series of still images.*

6. *Use the FFMPEG library to extract video metadata information (frames per second, number of frames, etc.).*

7. *Use named pipes, fork(), and exec() to implement inter-process communication in the face detection pipeline.*

8. *Create dynamically-driven web page content using Apache.*

9. *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 may purchase this book from an online bookstore such as Amazon, Barnes and Noble, etc.

Other Readings

PostgreSQL: Up and Running by Regina Obe and Leo Hsu. This book is available electronically from San Jose Public Library at http://discover.sjlibrary.org/iii/encore/record/C__Rb5702227

Learning OpenCV: Computer Vision with the OpenCV Library by Gary Bradski and Adrian Kaehler. This book is available electronically from San Jose State University Library at https://sjsu-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=01CALS_ALMA71454868430002901&context=L&vid=01CALS_SJO&search_scope=EVERYTHING&isFrbr=true&tab=everything&lang=en_US

Other technology requirements / equipment / material

You will be provided with a blank 120GB solid state drive with a USB3.1 interface. On this drive, you will configure and install 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, the OpenFace library, and the FFMPEG library. Once configured, you will be able to use this drive specifically for this class with all the tools necessary to create a computer vision pipeline.

Library Liaison

Kate Barron, kate.barron@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 Canvas Leaning Management System course login website at http://sjsu.instructure.com. Students are strongly encouraged to ask the instructor for clarification on each programming assignment specification.

Each team will give four presentations to the class. These presentations are mandatory and graded. The first three presentations represent progress reports: Conceptual design reviews and prototype demos; Application design reviews; and Code reviews. In the fourth presentation (Application demonstration and contribution), each member of the team is expected to discuss their contributions on the project to the class as well as provide an application demonstration.

Each student is also expected to write a final project report. In this report, students will reflect on their own contributions as well as discuss the contributions of their team-mates. Lastly, there will be one midterm and one final exam.

Participation and strong communication are critical components for successfully completing this course. Each student is expected to contribute on their team's project. If there are problems on a team (i.e. communication or participation), team members (both individually or as a group) are strongly encouraged to discuss the matter privately with the instructor as soon as possible. **Students who do not contribute towards their team-project risk failing this class.**

Final Examination or Evaluation

There will be a final exam on **Wednesday, May 16 in SCI-311 at 2:45PM**. The final exam will be based on in-class lecture material and material from our textbook. The final exam will be comprised of fifteen multiple-choice questions. This is a closed note, closed-book exam. No electronic devices (including mobile phone) may be used during the exam. The final exam is worth 15% of your overall grade.

Grading Information

Determination of Grades

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

Grade breakdown

ASSIGNMENT OR EXAM	POINT VALUE
Biographical writeup*	2
Programming Assignment 1: Database schema**	4
Programming Assignment 2: Web-based user login**	6
Programming Assignment 3: Extract still images from video**	8
Programming Assignment 4: Determine facial landmarks**	8
Programming Assignment 5: Track eye pupils**	8
Programming Assignment 6: Web-based display results**	8
Presentation: Conceptual design reviews and prototype demos*	2
Presentation: Application design reviews*	2
Presentation: Code reviews*	2
Presentation: Application demonstration and contribution*	10
Final Project Report*	10
Midterm Exam*	15
Final Exam*	15
TOTAL POINTS	100

* Graded as an individual
** Graded as a group (each member of the group gets same grade)

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.

Late assignments

Programming assignments submitted after their specified due date will be considered late and subject to minimally 50% loss in points (additional points will be deducted for incomplete projects as noted above).

Classroom Protocol

Regular class attendance is highly recommended. Please plan to arrive early or on-time. Arriving to class late is disruptive to students and the instructor. 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 at http://www.sjsu.edu/gup/syllabusinfo/

CS-160 / Software Engineering, Spring 2018, Course Schedule

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	Wednesday, January 24	Introduction: Course goals and objectives. Lecture: What is software engineering? Readings: Chapter 1 of *Beginning Software Engineering*
1	Monday, January 29	In-class assignment: Your programming experience and biographical information
2	Wednesday, January 31	Postgres RDBMS (Relational Database Management System)
2	Monday, February 5	Document management Readings: Chapter 2 of *Beginning Software Engineering*
3	Wednesday, February 7	FFMPEG library and systems programming tools
3	Monday, February 12	Project management Readings: Chapter 3 of *Beginning Software Engineering*
4	Wednesday, February 14	Processing FORM data from an HTTP POST
4	Monday, February 19	Lecture: Requirement gathering Read: Chapter 4 of *Beginning Software Engineering*
5	Wednesday, February 21	**Team presentations: Conceptual design reviews and prototype demos**
5	Monday, February 26	**Team presentations: Conceptual design reviews and prototype demos**
6	Wednesday, February 28	Lecture: High and low-level design Read: Chapters 5 and 6 of *Beginning Software Engineering*
6	Monday, March 5	Lecture: Secure session management with HTTP
7	Wednesday, March 7	Lecture: Programming the Postgres C API (Application Programmer Interface)
7	Monday, March 12	Lecture: Development Read: Chapter 7 of *Beginning Software Engineering*
8	Wednesday, March 14	**Team presentations: Application design reviews**
8	Monday, March 19	**Team presentations: Application design reviews**
9	Wednesday, March 21	**MIDTERM EXAM**
--	Monday, March 26	SPRING BREAK: NO CLASS TODAY
--	Wednesday, March 28	SPRING BREAK: NO CLASS TODAY
9	Monday, April 2	Lecture: Active Shape Modelling (ASM) and Active Appearance Modelling (AAM)
10	Wednesday, April 4	Lecture: Testing Read: Chapter 8 of *Beginning Software Engineering*

Week	Date	Topics, Readings, Assignments, Deadlines
10	Monday, April 9	Lecture: Eye pupil tracking
11	Wednesday, April 11	Lecture: Deployment, Metrics, and Maintenance Read: Chapters 9, 10, and 11 of *Beginning Software Engineering*
11	Monday, April 16	Lecture: Drawing with OpenCV
12	Wednesday, April 18	Lecture: Delaunay triangles
12	Monday, April 23	Lecture: Predictive models Read: Chapter 12 of *Beginning Software Engineering*
13	Wednesday, April 25	**Team presentations: Code reviews**
13	Monday, April 30	**Team presentations: Code reviews**
14	Wednesday, May 2	Lecture: Iterative models Read: Chapter 13 of *Beginning Software Engineering*
14	Monday, May 7	Lecture: Rapid Application Development (RAD) Read: Chapter 14 of Beginning Software Engineering
15	Wednesday, May 9	*Application demonstration* **DUE: Programming Assignment 1** **DUE: Programming Assignment 2** **DUE: Programming Assignment 3** **DUE: Programming Assignment 4** **DUE: Programming Assignment 5** **DUE: Programming Assignment 6**
15	Monday, May 14	*Application demonstration* **DUE: Final Project report**
Final Exam	Wednesday, May 16	**FINAL EXAM at 2:45PM in SCI-311**