



Basic Course Information

Semester:	Spring 2025	Instructor Name:	Octavio Ortiz
Course Title & #:	ENGR 100	Email:	octavio.ortiz@imperial.edu
CRN #:	20981	Webpage (optional):	Canvas
Classroom:	4300	Office #:	2767.1
Class Dates:	2/10 – 6/6	Office Hours:	See Schedule (attached)
Class Days:	M/W	Office Phone #:	760-355-5706
Class Times:	10:15 – 12:45 PM	Emergency Contact:	Silvia Murray
Units:	3	Class Format/Modality:	In-Person

Course Description

This course is designed for students to gain hands-on engineering experience in electrical and computer engineering through projects in team building environments. Topics include circuit theory, assembly, systems programming and debugging, transducer mechanisms and interfacing transducers, signals and system theory, digital processing, modular design techniques and robotics/control.

Course Prerequisite(s) and/or Corequisite(s)

None

Student Learning Outcomes

Upon course completion, the successful student will have acquired new skills, knowledge, and or attitudes as demonstrated by being able to:

1. Demonstrate problem solving strategies by identifying an appropriate method to solve a given problem, correctly set up the problem, perform the appropriate analysis and computation, and share their interpretation of the conclusion or the outcome, using correct grammar or in an oral presentation. Students will be assigned a final project where they are to display their results and discuss their thought processes. (ILO1, ILO2)

Course Objectives

Upon satisfactory completion of the course, students will be able to:

1. Learn how to work and make Arduino circuitry communicate with basic sensors and LEDs;
2. Learn the fundamentals of digital signal processing by working with a one-dimensional audio signal and how to manipulate these signals with software tools such as MATLAB;
3. Gain a general understanding of how a system can be modeled and how mathematical control concepts can be implemented into a micro-controller;
4. Learn the digital representation of RGB and Greyscale images, filtering and special image effects;
5. Demonstrate knowledge of CAD software in order to design circuits for use in controlling and manipulating control circuits.
6. Understand the difference between time and frequency domains, and are exposed to various types of filters;
7. Learn the use of LED and a photo-resistor in a simple communication device as are used in building robots and other moving computer aided devices;
8. Demonstrate knowledge in using implementing Infrared communication devices as used in robotics;
9. Learn about timers and frequency, when programming infrared (IR) protocols into programmable devices;
10. Demonstrate how an IR remote is able to send data to Arduino devices and how to decode these IR signals which are hex values;

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11. Learn how to use basic laboratory equipment such as power supplies, function generators, oscilloscopes, soldering irons, and other electrical equipment.
12. Work as a team to piece together various circuits, code, an Arduino, motor shield and cart chassis with motors.

Textbooks & Other Resources or Links

None

Course Requirements and Instructional Methods

Students will be exposed to various instructional methods. Lectures will introduce engineering topics to students. Students will then apply what they learn in lectures to hands-on activities. Guidance and modeling will be provided during these hands-on activities.

A total of five labs, that involve Arduino manipulation, programming, computer aided design (CAD) modeling, and presentation and communication skills, will make up the vast majority of the semester. Students will then work on a final project where they will rely on what they have learned throughout the semester to create an application of their own. Quizzes on various topics will be administered throughout the semester to assess students' knowledge base.

Course Grading Based on Course Objectives

ASSIGNMENT	POINTS
Lab Assignments	40%
Lab 0	
Lab 1	
Lab 2	
Lab 3	
Lab 4 & Peer Evaluation	
Skills & Tools	20%
CAD, Programming: C, MATLAB, PCB	
Quizzes	10%
Final Project	30%
Total	100%

Score	Letter Grade
≥ 90%	A
≥ 80%	B
≥ 70%	C
≥ 60%	D
< 60%	F

Academic Honesty (Artificial Intelligence -AI)

IVC values critical thinking and communication skills and considers academic integrity essential to learning. Using AI tools as a replacement for your own thinking, writing, or quantitative reasoning goes against both our mission and academic honesty policy and will be considered academic dishonesty, or plagiarism unless you have been instructed to do so by your instructor. In case of any uncertainty regarding the ethical use of AI tools, students are encouraged to reach out to their instructors for clarification.



Accessibility Statement

Imperial Valley College is committed to providing an accessible learning experience for all students, regardless of course modality. Every effort has been made to ensure that this course complies with all state and federal accessibility regulations, including Section 508 of the Rehabilitation Act, the Americans with Disabilities Act (ADA), and Title 5 of the California Code of Regulations. However, if you encounter any content that is not accessible, please contact your instructor or the area dean for assistance. If you have specific accommodations through **DSPS**, contact them for additional assistance.

We are here to support you and ensure that you have equal access to all course materials.

Course Policies

Attendance:

Attendance is mandatory. Students are expected to attend every class meeting. Lectures will preview lab assignments.

- Although attendance is not explicitly factored into your grade, failing to complete programming assignments and assessments due to absences will negatively impact your grade.
- Students with excessive absences will be dropped from the course as outlined in AP 5075.

Late Submissions:

Lab assignments are to be completed and submitted by the due date stated on Canvas. Late lab assignments will be accepted and penalized as follows:

- 90% maximum score if submitted within 24 hours past due date
- 80% maximum score if submitted within 48 hours past due date
- 70% maximum score if submitted within 72 hours past due date
- 50% maximum score if more than three days and less than a week past due date
- No credit will be given to assignments that are submitted past the hard deadline (see calendar)

Final project will NOT be accepted late.

Drop Policy

The instructor reserves the right to drop students who fail to attend the first-class session or fail to complete the first assignment by the assigned due date.

Other Course Information

Resources:

[Arduino.cc](https://arduino.cc) – Arduino help and support

[Mathworks.com](https://mathworks.com) – MATLAB support

mySolidWorks.com – SolidWorks support

[Sparkfun.com](https://sparkfun.com) – Maker hardware community & supplies

[Adafruit.com](https://adafruit.com) – Maker hardware community & supplies

[Instructables.com](https://instructables.com) – Maker community & projects

[Thingiverse.com](https://thingiverse.com) / [Grabcad.com](https://grabcad.com) – CAD files

[Autodesk.com](https://autodesk.com) – Software (incl. EagleCAD), free for students

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Financial Aid

Your Grades Matter! In order to continue to receive financial aid, you must meet the Satisfactory Academic Progress (SAP) requirement. Making SAP means that you are maintaining a 2.0 GPA, you have successfully completed 67% of your coursework, and you will graduate on time. If you do not maintain SAP, you may lose your financial aid. If you have questions, please contact financial aid at finaid@imperial.edu.

IVC Student Resources

IVC wants you to be successful in all aspects of your education. For help, resources, services, and an explanation of policies, visit <http://www.imperial.edu/studentresources> or click the heart icon in Canvas.

Anticipated Class Schedule/Calendar

[Provide a tentative overview of the readings, assignments, tests, and/or other activities for the duration of the course. A table format as in the example below may be used for this purpose.]

Week	Date	Topic	Assignment
Week 1	2/10	- Intro to ENGR 100 – Course Overview/Syllabus - Student Intros - Coding/SolidWorks tutorial	
	2/12	Coding Fundamentals	
Week 2	2/17	President's Day – No Class	
	2/19	- SolidWorks Tutorial - SolidWorks Assignment	
Week 3	2/24	- Electrical Engineering Fundamentals - Current, Voltage, Resistance - Arduino IDE - Blink, functions	
	2/26	Morse Code Activity	
Week 4	3/3	Morse Code Activity	
	3/5	- Lecture: Intro to Circuits and Programming - Lab 0: Intro to Arduino - Lecture: Basic Circuitry & Multimeters - Lab 0: Intro to Arduino (Continued)	
Week 5	3/10	- Lab 0: Extra Challenges - Wrap-Up and Review Lab 0	
	3/12	- Lecture: Circuits & Programming Review - Explore: Create your own circuit	
Week 6	3/17	- Lecture: Communication - Intro to Lab 1: Communication with IR	
	3/19	Lab 1: Communication with IR	
Week 7	3/24	- Lab 1: Communication with IR - Wrap-Up and Review Lab 1	
	3/26	Introduction to MATLAB	
Week 8	3/31	MATLAB Onboard Training	
	4/2	Lecture: Digital Signal Processing	



Week	Date	Topic	Assignment
Week 9	4/7	○ Lab 2 part 1: Sampling with MATLAB	
	4/9	○ Lab 2 part 1: Frequency Domain/FFT with MATLAB	
Week 10	4/14	○ Lab 2 part 2: Image Processing	
	4/16	• Lab 2 part 2: Extra Challenges ○ Wrap-Up and Review Lab 2	
Spring Break			
Week 11	4/28	• Lecture: Teams and Design ○ Lab 4: SolidWorks – Computer Aided Design (CAD)	
	4/30	○ Lab 4: SolidWorks – CAD, Imagination	
Week 12	5/5	• Lecture: Control and Robotic Systems ○ Lab 4: PID Controls	
	5/7	○ Lab 4: PID Controls	
Week 13	5/12	• Lecture: Technical Communication ○ Commence Final Projects	
	5/14	• Final Projects	
Week 14	5/19	• Final Projects	
	5/21	• Final Projects	
Week 15	5/26	Memorial Day – No Class	
	5/28	• Final Projects	
Week 16	6/2	○ Presentations	
	6/4	• Presentations	

Subject to change without prior notice



IMPERIAL VALLEY COLLEGE

OCTAVIO ORTIZ

IVC Instructor's Schedule of Classes and Office Hours

Science, Math and Engineering Department

Spring 2025

		7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM
M	COURSE										
	CRN										
	LEC/LAB										
	FACULTY										
T	COURSE										
	CRN										
	LEC/LAB										
	FACULTY										
W	COURSE										
	CRN										
	LEC/LAB										
	FACULTY										
R	COURSE										
	CRN										
	LEC/LAB										
	FACULTY										
F	COURSE										
	CRN										
	LEC/LAB										
	FACULTY										

Course No	Sections	Lec Hrs	Lab Hrs
ENGR 100	1	2	3
ENGR 212	1	3	0
ENGR 240	1	3	0
CS 221	1	2	3
CS 231	1	2	3
Total		12	9

Instructor's Name	Octavio Ortiz
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