

# ECE 3 – Introduction to Electrical and Computer Engineering

## Syllabus – Fall 2021

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Lectures	MW 12:30 PM – 1:45 PM	Location: <a href="#">CHEM 1171</a>
Labs	M 6:00 – 7:50 PM (Monsij) Tu 6:00 – 7:50 PM (Orestis) W 5:00 – 6:50 PM (Alejandro) Th 6:00 – 7:50 PM (Bella)	Location: <a href="#">ESB 1003</a>

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Office hours (OH) are held in the ECE TA Offices in Trailer 699, Room 103, located in front of Harold Frank Hall.

## Staff

### Instructor

[Nina Miolane](#) OH: W 2:00-3:00 PM  
[ninamiolane@ucsb.edu](mailto:ninamiolane@ucsb.edu)

### TAs

Biswal, Monsij <a href="mailto:mbiswal@ucsb.edu">mbiswal@ucsb.edu</a>	OH: M 4:00 - 5:00 PM	Lab: M 6:00 - 7:50 PM
Paraskevas, Orestis <a href="mailto:orestis@ucsb.edu">orestis@ucsb.edu</a>	OH: Tu 4:45 - 5:45 PM	Lab: Tu 6:00 - 7:50 PM
Quevedo, Alejandro <a href="mailto:alejandromquevedo@ucsb.edu">alejandromquevedo@ucsb.edu</a>	OH: W 2:00 - 3:00 PM	Lab: W 5:00 - 6:50 PM
Yue, Bella <a href="mailto:yixiaoyue@ucsb.edu">yixiaoyue@ucsb.edu</a>	OH: Th 11:00 - 12:00 PM	Lab: Th 6:00 - 7:50 PM

### Contacting staff

**Questions.** Please ask questions about class reading, lectures, and homework by posting online on Slack. Other students probably have the same question as you, so it will be helpful for everyone to see the responses. It is also the quickest way to get an answer. The office hours are another opportunity to ask your questions. Please avoid using emails to ask questions.

**Admin.** For administrative inquiries, please only email the instructor. Keep all emails short and to-the-point, use UCSB email, and use ECE 3 in the subject line. Avoid email attachments (e.g. doc and pdf files) if possible.

**Feedback.** We welcome your feedback regarding the course at any point. Please feel free to email us directly and use ECE 3 in the subject line. Alternatively, you can leave anonymous feedback for the course staff by placing an anonymous note in Nina Miolane's mailbox at Harold Frank Hall.

## Overview

This course represents a comprehensive foundation for core ECE topics in signal processing, image analysis, machine learning, optimization and control. The lectures will present concepts from linear algebra, such as matrix computations, systems of linear equations, eigenspace decomposition, inner-product, orthogonality, least-squares and linear regression.

Students will actively engage with the technical materials with an introduction to Python programming and associated hands-on sessions. The materials will be motivated by real-world scenarios ranging from medical imaging to autonomous vehicles, from music analysis to GPS design.

This course is aimed to be:

- **Active:** The classroom experience should be more like a conversation than a one-directional transmission of information.
- **Evidence-based:** Frequent assessments will provide the instructors with ongoing information about student learning so that we can base the progression of the course on data rather than subjective impressions.

The goal of this course is to provide an understanding of the essential concepts and "big ideas" of electrical and computer engineering, as well as the skills to employ these concepts on real data to solve authentic real-world problems.

**Prerequisites:** Students should have a solid understanding of high school mathematics, specifically algebra and general calculus.

## Outline

Unit 1: Vectors

Unit 2: Matrices

Unit 3: Least Squares

## Unit 4: Eigen-decomposition

### Attendance

**Lectures.** Students are required to attend all the lectures. Students cannot enroll in other UCSB courses whose schedule is conflicting with ECE 3 schedule. If a student cannot attend all ECE 3 lectures, please drop this class.

**Labs.** Each student will participate in a weekly two-hour long lab session with a TA. Students are required to attend all of their lab sessions. Please do not switch your registered sections otherwise we will not be able to confirm your attendance. The material in lab sessions is complementary to the lectures and is not meant as a substitute, and will also help you with the programming-based HW assignments. If a student cannot attend all ECE 3 labs, please drop this class.

**Exam.** Unless you have accommodations as determined by the university and approved by the instructor, you must take the exams at the date, time and location they are scheduled. Please check your course schedule and make sure that you have no conflicts with these exams. There will be no makeup exams. If you miss an exam, you will receive an F.. If a student cannot attend all ECE 3 exams, please drop this class.

**Exception: Emergency.** If you miss a lecture, lab, or exam due to an emergency, you should contact the instructor as soon as possible via email. Be prepared to bring official, written proof of a serious medical or other emergency that will be reported to UCSB.

**Exception: Covid-19.** If you are feeling ill or suspect you may have been exposed to someone who is ill, please stay home. Let the instructor and/or your TA know within 24 hours, and we will make arrangements for you.

### Resources

#### Textbooks

The class mostly follows the following two textbooks:

- [Introduction to Linear Algebra](#), by Stephen Boyd and Lieven Vandenberghe.
- [Introduction to matrix computations](#), by Margot Gerritsen

Both textbooks are freely available online.

The following textbooks are considered supplemental to classes:

- Schaum's Outlines of Linear Algebra, 5th ed. by Seymour Lipschutz and Marc Lipson.
- Introduction to Linear Algebra by Gilbert Strang, 5th Ed.

- Think Python, 2nd ed. by Allen B. Downey  
[greenteapress.com/wp/think-python-2e/](http://greenteapress.com/wp/think-python-2e/)

We will not cover all topics in the books. We will cover a few topics not in the books.

## Software

We use:

- Python version 3.7 or higher as our programming language,
- Jupyter notebooks to run Python interactively in a web browser.

Download Anaconda which will install everything you need to run Python 3.7+ and Jupyter notebooks:

- Anaconda: <https://www.anaconda.com/download>

The TAs will demo the setup process in the first lab session the first week of classes.

Note that ECE 3 is not a programming course, you will have other courses dedicated to programming. Instead, our goal is to use Python to illustrate fundamental ideas of electrical and computer engineering. You will learn the basic rules on how to read and write Python code by doing.

## Slack Workspace

Join ECE 3 slack workspace with your @ucsb.edu email address through the invitation you have received via email or [with this link](#).

Make it a habit to check Slack several times a week. Check for announcements, reading material, HW assignments, see if you can answer your classmates' questions yourself.

Syllabus and lecture slides will be available through Slack. The slides are not intended to replace attendance since much of the class activity will go beyond the slides.

We use Slack to allow you to get help efficiently from both your classmates and the instructors. Please post your questions about the course material and course logistics to Slack so that everyone can benefit from the answer. We also highly encourage you to answer your classmates' questions whenever possible – you will get extra practice with the material and receive feedback from the course staff about your answers.

Please do not use Slack to post outright solutions to homework problems. You can, of course, discuss the exercises and ways to solve the problems

GitHub <https://github.com/bioshape-lab/ece3>

The slides will be posted after each lecture on GitHub. You can download them in html or pdf format. Alternatively, you can directly run the code from the slides using the Binder link provided on this GitHub repository.

The labs will also be posted on GitHub.

**Datacamp** <https://www.datacamp.com/>

We use Datacamp to provide hands-on learning with Python. You will receive up to 10% credit for completing each of the courses assigned on Datacamp. These courses need to be completed before their assigned deadline of November 2nd to be eligible for extra credits.

In order to connect to the class on Datacamp, follow this link:

[https://www.datacamp.com/groups/shared\\_links/a6b0617c7b39c92571182c2ec1eaea68cb751aecfd6eeaf8462d19a9bbc0d136](https://www.datacamp.com/groups/shared_links/a6b0617c7b39c92571182c2ec1eaea68cb751aecfd6eeaf8462d19a9bbc0d136)

and connect with your @ucsb.edu email address.

Course in "Assignments": "Intermediate Python":

- Using "matplotlib" to plot data in Python
- Using dictionaries and "pandas" to manipulate data in Python
- Basic Python operations: Logic, Control Flows and Filtering
- Loops: For loops and while loops
- Case Study: Hacker Statistics

We very strongly recommend completing this course within the first 2 weeks: it will help you with the homework! Additionally, Python is used everywhere in ECE: learning the basics as soon as possible will save you tremendous amounts of time.

## GradeScope

We use Gradescope to post homework and post corrections. Students need to submit their homework to Gradescope. The grades will also be posted on Gradescope.

## Grading

Your grade will be determined as follows:

- Homeworks: 55%
- Final: 40%
- Constructive Participation: 5%
- Extra credit: up to +15% total

Unless otherwise stated, you can use any published resource you wish to complete any assessment in class or at home (textbook, Internet, etc).

The grade scale will be curved so that approximately 1/3 of the students receive an A/A-, 1/3 receive a B+/B/B-, and 1/3 receive a C+ or below. This will only be adjusted in the students favor: if, for example, more than 1/3 of the students master the material at an A level, then more than 1/3 of the students will receive As.

A+ grades and F grades. A+ grades may be awarded to the very best performing students in the class. The cutoff for A+ grades will be determined at the end of the course at the discretion of the instructor. If a student misses a homework or an exam, the student will receive an F. If a student cannot attend all ECE 3 exams, please drop this class.

## Homework

Homework is posted on Slack every Thursday at 11:59 pm PST, starting from the 2nd week. There is no homework for the last week. They are due at 11:59 pm PST on Thursday, the week after they are posted. Start working on the homework problems as soon as they are posted, and allow adequate time to complete them.

Your lowest homework score will be weighted by 50% in the calculation of your overall homework grade.

There is no makeup homework. Late homework will not be graded. If a homework is submitted late, the student will receive a F. There will be no exception to this rule.

Homework must be submitted online on Gradescope. Any other submission types are not accepted. Please do not email homework to the course staff. Students may submit a single homework multiple times, before the due time. For example, if there is a mistake in the first submission, students can correct it and resubmit the corrected version. The course staff will only grade the last version that is submitted before the deadline.

Plots are often important display items to answer homework questions. Please provide accurate, clear, and labeled graphics with readable fonts.

## Exams

- There is no midterm exam for this class.
- Final exam: Tuesday, December 7, 2021 12:00 PM - 3:00 PM.
  - Location: [CHEM 1171](#).

If you are late for the final exam, you will not be given extra time. If you miss the final exam, you will receive an F grade. There is no makeup final exam.

## Constructive participation in class, labs, Slack and GitHub

Students will receive credits for interacting in class and during labs, for asking pertinent questions or giving answers. On Slack, students who provide frequent, high-quality answers will receive credit on their final course grades.

## Extra credits

Students will be offered extra credit for completing relevant online courses via Datacamp throughout the quarter (up to + 10%). Students will be offered extra credit for submitting corrections or suggestions to the slides or to any of the course materials (up to + 5%).

## Grade disputes

Students must wait 24 hours after receiving a grade before they can dispute it, after which disputes must be received within 7 days of receipt of the grade. Grade disputes must be submitted to the TAs and the instructor by email.

**Homework.** As for homework, please read the relevant solutions and review the relevant course material prior to sending a request and specify (1) the part(s) of the homework that should be regraded and (2) reasons for regrading. The course staff will typically regrade the entirety of any homework for which any regrade is requested and the resulting score may be higher or lower than the original one. Please allow up to two weeks to receive the complete regrading reports. There will be no homework grade changes after the final exam date.

## Covid-19 guidelines

In order to act in the best interests of our shared classroom community, please be sure to abide by policies established by the University of California and UC Santa Barbara. As a reminder, all members of our campus community are required to follow the [University of California Covid 19 Vaccination policy](#).

- Please complete the daily symptom survey before coming to class. Do not come to class if your badge is not green. So that we can all feel confident that we have all remembered to complete the survey, we may periodically show one another our daily clearance badges before starting the day's class.

- Remember that we all must wear masks indoors at all times. If you forget your mask, please take time to get one from your dorm or from one of the available distribution spots. You will not be penalized for late arrival if you need to do so.
- If you are feeling ill or suspect you may have been exposed to someone who is ill, please stay home. Let your instructor and/or your TAs know, and we will make arrangements for you.
- Please also remember that weekly testing is required for all non-vaccinated undergraduate students, and recommended for all other non-vaccinated groups. Testing is also available to any member of our campus community free of charge. For more information, visit the [UCSB COVID-19 testing site](#).

This class is designed for in-person courses. If the situation changes and public health guidelines recommendations change, or if the instructor needs to self-isolate, we will let you know and we will modify our course format, using Zoom, Slack, GitHub, and other platforms to continue our work together. We will communicate with you via email. Please be sure to use your @ucsb email for that purpose and be sure to check your email at least once daily.

#### General Compliance

- Student non-compliance with COVID-19 health and safety requirements or with related directions from the instructor is a violation of the UCSB Student Code of Conduct and will be adjudicated accordingly.
- All students of this course, as a condition of physical presence in this classroom (including for exams or tests in this classroom or any other location on the UCSB campus), must be compliant with the UC SARS-CoV-2 (COVID-19) Vaccination Program at all times.

## Code of conduct

You are expected to treat the course staff and your classmates with courtesy and respect. This class should be a harassment-free learning experience for everyone regardless of gender, gender identity, and expression, sexual orientation, disability,



physical appearance, body size, race, age, or religion. Harassment of any form will not be tolerated.

**Reporting.** If someone makes you or anyone else feel unsafe or unwelcome, please report it as soon as possible to the course staff. If you are not comfortable approaching the course staff, you may also contact the UCSB Well-being office:  
<https://wellbeing.ucsb.edu/>.

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let us know. Feel free to correct us on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact us via email, using ECE 3 in the subject line.

**Academic Honesty.** Cooperation has a limit! You should not share your code or answers directly with other students. Doing so does not help them; it just sets them up for trouble on exams. Feel free to discuss the problems with others beforehand, but not the solutions. Please complete your own work and keep it to yourself. Penalties for cheating are severe — they range from a zero grade for the assignment or exam up to dismissal from the University, for a second offense. Rather than copying someone else's work, ask for help. You are not alone in this course! We are here to help you succeed. If you invest the time to learn the material and complete the projects, you will not need to copy any answers.

Thank you and best wishes for the new Academic Year! 😊