

ECE 302 - Linear System Analysis

Old Dominion University
Department of Electrical and Computer Engineering
Fall 2025

Instructor

W. Steven Gray
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Office Hours: Monday & Friday, 13:30 - 15:00 EST, Location: [Zoom](#)

Teaching Assistant

Fatima Raza
Email: fraza001@odu.edu
Office Hours: Monday, 16:00 - 17:00 EST, Location: [Zoom](#)

Lectures

Time: Monday & Wednesday 18:00 - 19:15 EST
Location: [Live via Zoom](#) ([ODU class launch pages](#))

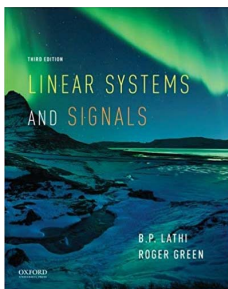
Course Webpage

<http://wstevengray.org/classes/ece302>
Canvas is only used to archive the lecture videos.

Pre/Corequisites

Prerequisite: ECE 202 - Circuit Analysis II (Letter grade of C or better)
Prerequisite: MATH 307/280 - Ordinary Differential Equations
Pre/corequisite: ECE 287 - Fundamental Electric Circuit Laboratory

Textbook



Linear Systems and Signals, 3rd Edition, B. P. Lathi and R. Green, Oxford University Press, 2017.

References

1. *Signals and Systems*, 3rd Edition, C.-T. Chen, Oxford University Press, 2004.
2. *Schaum's Outline of Signals and Systems*, 2nd Edition, H. P. Hsu, McGraw-Hill, Inc., 2010.

Course Objectives

The objective of the course is to introduce the basic elements of continuous-time linear system theory and signal representation. Topics include time and frequency domain analysis of linear time-invariant systems, Fourier series and transforms, and state space analysis. Applications will focus primarily on circuit analysis, signal filtering, and control.

Grading Policy

Homework - 10% (weekly)

Midterm Exam 1 - 25% week 6: October 1, 2025, Wednesday, 18:00 - 19:15 EST

Midterm Exam 2 - 25% week 11: November 5, 2025, Wednesday, 18:00 - 19:15 EST

Final Exam - 40% exam week: December 8, 2025, Monday, 15:45 - 18:45 EST

Contact your instructor at any time if you have a concern about your course performance.

Course Policies

1. This course will be run exclusively online. Live interactive lectures will be broadcast via Zoom at the link given above. It is strongly advised that students attend the lectures live to get the most out of the course. Lectures will be taped and archived for later viewing.
2. The [course webpage](#) is the clearinghouse for all information concerning the course. It will be updated frequently, so check it first when you have any questions or concerns. Canvas is only used to archive the lecture videos.
3. The text is an integral part of the course. You are responsible for the topics in the chapters cited in the course outline below. It will not be possible to cover every topic in detail in lecture. Therefore, you should be reading the text concurrently with the presentation of the material in lecture. If you are not reading the text, then your performance will not be as good as a student who is.
4. On average homework will be assigned once a week and collected the following week. All homework must be submitted by email to our TA (fraza001@odu.edu) by 18:00 EST on the due date using:
 - (a) Subject line: Last Name, First Name, ECE 302 Homework X
 - (b) File name: LastName_FirstName_ECE302_Homework_X

Late homework will not be accepted since solutions will be posted on the course webpage shortly after class. See your instructor *in advance* in case of extenuating circumstances. All grade appeals concerning homework should first be addressed to the TA.

5. All submitted assignments should be in a single .pdf file, organized, neat, and professional in appearance. Handwritten assignments are fine. You can use either a tablet or scan your papers using what every technology you prefer. (This [app](#) works well.) Have a back-up plan just in case.
6. Online office hours are available to meet with the instructor and the TA. Come with specific questions prepared in advance for the best outcome. Other meeting times are available by appointment.
7. Matlab software will be used in some of the homework assignments. You can install this software on your laptop following the instructions [here](#). You might consider purchasing the Student Edition of MatLab/Simulink directly from [MathWorks](#).

Honor System

The Honor System at Old Dominion University is based on individual integrity. In registering for ECE 302, you have agreed to adhere to the following Honor Pledge:

"I pledge to support the Honor System at Old Dominion University. I will refrain from any form of academic dishonesty or deception, such as cheating or plagiarism. I am aware that as a member of the academic community it is my responsibility to turn in all suspected violators of the Honor Code. I will report to an Honor Council hearing if summoned."

Additional information is available at the website:

<https://www.odu.edu/oscai>

Educational Accessibility

The Old Dominion University's educational accessibility policy is:

"Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester."

Additional information is available at the website:

<https://www.odu.edu/accessibility>

Course Outline

1. Signals and Systems - Chapter 1

- Size of a signal
- Signal operations
- Classification of signals
- Some signal models
- Even and odd functions
- Systems
- Classification of systems

2. Time-Domain Analysis of Continuous-Time Systems - Chapter 2

- Zero-input response
- Impulse response
- System response to arbitrary input
- Convolution algebra
- System stability

3. Continuous-Time Signal Analysis: The Fourier Series - Chapter 6

- Periodic signal representation by trigonometric Fourier series
- Existence and convergence of the Fourier series
- Exponential Fourier series
- LTI system response to periodic inputs

4. Continuous-Time Signal Analysis: The Fourier Transform - Chapter 7

- The Fourier transform
- Relationship between the Fourier and Laplace transforms
- Properties of the Fourier transform
- LTI system analysis with the Fourier transform
- Ideal and practical filters

5. Linear Algebra and State Space Analysis - Appendix B.6, Chapter 10

- Matrix algebra
- Eigenvalues and eigenvectors
- State space models
- Canonical realizations
- Solving the state equation
- Model decomposition
- Internal and external stability