

ESE 305: Deterministic Signals and Systems

Fall 2023

Catalog Description:

Introduction to signals and systems. Manipulation of simple analog and digital signals. Relationship between frequencies of analog signals and their sampled sequences. Sampling theorem. Concepts of linearity, time-invariance, causality in systems. Convolution integral and summation; FIR and IIR digital filters. Differential and difference equations. Laplace transform, z-transform, Fourier series and Fourier transform. Stability, frequency response and filtering. Provides general background for subsequent courses in control, communication, electronics, and digital signal processing.

Course Prerequisites: ESE 271

Course Credits: 3

Textbook: Alan V. Oppenheim, Signals and Systems, Pearson, 1996.

Class Meetings: Mon Wed 11:00 am - 12:20 pm

Faculty: Vibha Mane
Email: vibha.mane@stonybrook.edu
Light Engineering, Room 258A

Office Hours: Posted on Brightspace

Course Dates and Duration: August 28 - December 21

Grading

Quizzes	20
Matlab Project	20
Attendance during Matlab Tutorials	5
Midterm	25
Final Exam	30

Learning Modules

- There are 5 Learning Modules. Each Module consists of:
 - PowerPoint Lectures
 - Reading list
 - Quiz
 - Assignments (no submission required)

Course Schedule

- The schedule for Learning Modules, Matlab Project and exam dates is posted in a file shared with the class.

Quiz Scores and Office Hour Visits

- The score for each Quiz is 4 pts. You can recover 2 out of the 4 pts in each Quiz through office hour visit or class participation.
- You will be given credit for one office hour visit per module, as per the module schedule. You can ask questions on any course material in any module.
- The office hour credit will apply to your lowest quizzes first.
- The max score for a Quiz cannot exceed 4 pts.
- Each student is allowed to miss one Quiz, due to illness or any other reason. Your score for one missed Quiz will be replaced by 4 pts. If you do not miss any Quiz, your lowest score will be replaced by 4 pts.
- The score adjustment will be made at the end of the semester.

Additional Notes

- In the event you miss an exam due to significant illness or any other personal emergency, alternative accommodation will be made. However, it is your responsibility to provide documentation to support such a request.
- There are no makeup exams to boost scores.
- There are no extra credits.
- No resubmission of assignments is allowed.
- Any grade dispute should be brought to the attention of the instructor within ten days of posting the grades.
- Stony Brook University makes religious accommodations. Please check the university religious holiday calendar for a list of major holidays and policies.

Course Learning Outcomes: Upon completion of the course, students will

- Have knowledge of discrete-time signals and their properties, and continuous-time signals and their properties.
- Have knowledge of Fourier series and Fourier transform representation of signals, and sampling theorem.
- Have applied the above concepts to solve engineering problems.
- Have implemented Matlab program to perform signal processing tasks.

Topics Covered:

Module 1	<p>Property of Signals: Periodic & aperiodic signals; even & odd signals; unit impulse function; unit step function; Dirac delta function & properties.</p> <p>Properties of Systems: Memory, causality, stability, time-invariance & linearity.</p> <p>Complex Variables: Cartesian & polar form; complex conjugate; reciprocal; Euler's formula.</p>
Module 2	<p>Discrete-time Linear Time-Invariant (LTI) Systems: Discrete-time convolution; discrete-time impulse response & characterization of LTI systems.</p> <p>Continuous-time LTI Systems: Continuous-time convolution; continuous-time impulse response & characterization of LTI systems.</p>
Module 3	<p>Fourier Transform: Aperiodic signals and Fourier transforms; examples of Fourier transform; properties of Fourier transforms - linearity, time reversal, scaling, duality, time shift, multiplication, and differentiation; generalized Fourier transforms.</p>
Module 4	<p>Fourier Series: Orthogonal functions; Fourier series representation of periodic signals; properties of Fourier series.</p> <p>Sampling: Fourier transform of periodic impulse train; sampling theorem; aliasing.</p>
Module 5	<p>Laplace Transform: Laplace transform properties and examples; region of convergence.</p>

Academic Integrity Statement

Each student must pursue their academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Student Accessibility Support Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@Stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Critical Incident Management Statement

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Electronic Communication

Email and especially email sent via Brightspace is one of the ways the faculty officially communicates with you for this course. It is your responsibility to make sure that you read your email in your official University email account. For most students that is Google Apps for education (<http://www.stonybrook.edu/mycloud>).

If you choose to forward your official University email to your another off-campus account, faculty are not responsible for any undeliverable messages to your alternative personal accounts. You can setup Google mail forwarding using these DoIT-provided Instructions found at <http://it.stonybrook.edu/help/kb/setting-up-mail-forwarding-in-google-mail>.

If you need technical assistance, please contact Client Support at 631-632-9800 or supportteam@stonybrook.edu.

Additional Resources

- To access mental health services, call Counseling and Psychological Services (CAPS) at 631-632-6720; Counselors are available to speak with 24/7.
- For updated information on the Academic Success and Tutoring Center (ASTC), please check www.stonybrook.edu/tutoring for the most up-to-date information.
- For IT Support: Students can visit the Keep Learning website at <https://sites.google.com/stonybrook.edu/keeplearning> for information on the tools you need for alternative and online learning.
- Need help? Report technical issues at <https://it.stonybrook.edu/services/itsm> or call 631-632-2358.
- For information on Library services and resources, please visit <https://library.stonybrook.edu>