

**ESE502 Linear Systems Fall 2021**  
Dept. of Electrical and Computer Engineering  
SUNY Stony Brook

**Instructor:** Chi Chen, email: Chi.Chen.1@stonybrook.edu

Class Meetings: Monday 6:05 pm - 9:00 pm, STALLER CT 3220

Office Hours: Thursday 6:30 pm - 10:30pm, Light Engr 208

**Books (recommended but not required)**

Chen, C.-T., "Linear System Theory and Design", 3rd edition, Oxford University Press, 1999. ISBN: 0-19-511777-8

Kailath, T., "Linear Systems", Prentice-Hall Englewood Cliffs, N.J., 1980. ISBN: 0-13-536961-4

**Course Outline**

This course is a basic introduction to the theory of linear systems. There are four essential elements:

1. Linear algebra, the mathematics underlying linear system theory. The first part of the course will cover the basic concepts of linear algebra. While most of you are probably familiar with this material, some may not be, and it will serve as a review for the others.
2. The internal description of linear systems | state variables.
3. The external description of linear systems | transfer functions and transfer function matrices
4. The relationship between the internal and external descriptions, including analysis, stability, realization, controllability and observability.

Linear systems are highly abstracted and simplified models of real systems, and so the treatment is highly theoretical. The following topics will be covered:

- Overview of Linear Systems
- Linearity, Time-Invariance, Continuous and Discrete Time Systems Relations and Functions
- Linear Algebra
- State-Space Solutions and Realizations
- Stability
- Controllability and Observability
- State Feedback and Estimators
- Minimality and Coprimeness
- Pole Placement and Model Matching

This corresponds to chapters 1, 2, 3, 4, 5, 6, and parts of 7, 8, and 9 in Book 1.

**Grading System**

There is a final exam. The course grade will be computed as follows:

Assignments: 30%      Final Exam: 70 %

Grades are assigned based on absolute percentage of total marks as below

(This policy is subject to change).

A : 91—100 , A- : 86—90 , B+ : 81—85 , B : 76—80 , B- : 71--75

C+ : 68—70, C : 64—67, C- : 61—63, D+ : 56—60, D : 51—55, F : 0--50

**Note1**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact the Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748 .They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

**Note2**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

**Note3**

The University at Stony Brook expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to observe national, state, and local laws and University regulations; and to respect the rights, privileges, and property of other people. Faculty are required to report disruptive behavior that interrupts faculty's ability to teach, the safety of the learning environment, and/or students ability to learn to Judicial Affairs.

**Note4**

Covid-19 policy—please refer to school policy <https://www.stonybrook.edu/policy/policies.shtml?ID=626> and/or any other updates