

## **ECE 312: Linear Systems Analysis II, Spring 2021**

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### **Time and Location:**

TR 2:00 PM -- 3:15 PM on Zoom

Please join the zoom meeting five minutes before the start of the lecture time (at 1:55 pm).

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### **Instructor:**

Ali Pezeshki

Contact Information: <Ali.Pezeshki@colostate.edu>

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### **Pezeshki's Office Hours:**

Tuesdays: 3:30 PM -- 4:30 PM on Zoom (except for the first Tuesday of each month)

Thursdays: 3:30 PM -- 4:00 PM on Zoom

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### **Pezeshki's Recitation Sessions:**

Tuesdays: 5:30 PM -- 6:30 PM on Zoom (starting Jan. 26, 2021; except for the first Tuesday of each month).

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### **Teaching Assistant (TA):**

Yifan (Robert) Yang: <Yifan.Yang@colostate.edu>

TA's Office Hours: MW 2:00 PM -- 3:30 PM on Microsoft Teams

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### **Textbook:**

A. V. Oppenheim, A. S. Wilsky, and S. H. Nawab, Signals and Systems, 2nd Edition, Prentice Hall, 1996.

### **Additional Reference (not required):**

S. Haykin and B. D. Van Veen, Signals and Systems, 2nd Edition, Wiley, 2002.

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### **Exam Calendar:**

- Assessment 1 (Exam 1): Feb. 25, 2021, 2:00 PM -- 4:00 PM; Covers LSM1, LSM2, and KI4.
- Assessment 2 (Exam 2): Apr. 20, 2021, 2:00 PM -- 4:00 PM; Covers LSM3, LSM 4, and KI5.
- Assessment 3 (Exam 3): May 11, 2021, 9:40 AM -- 11:40 AM; Comprehensive: Covers all LSMs and KIs.

All exams are remote. They will be released on Canvas at the start time for the exam and must be submitted as a single PDF file to Canvas by the end time for the exam.

## Grading:

- Knowledge Integration (KI): 10%
- Homework: 20%
- Assessment 1 (Exam 1): 20%
- Assessment 2 (Exam 2): 20%
- Assessment 3 (Exam 3): 30%
- Math Foundation: 2% (Extra Credit)

Note 1: Regular attendance in class is required.

Note 2: KI grade consists of several components, including prework, question/discussion contributions, video presentations, and social responsibility case studies. Please see the KI Canvas course for details. The teaching assistant in charge of KI Canvas course is **Michael Greer** <m.r.Greer@colostate.edu>.

Note 3: Late homework submissions will not receive credit.

Note 4: Demonstrating competency in each Learning Studio Module (LSM) of the course is required. Competency is assessed through Assessment 1 (for LSM 1 and LSM 2), Assessment 2 (for LSM 3 and LSM 4), and Assessment 3 (for LSM 5). Students who do not demonstrate competency in an LSM will be notified after the corresponding assessment and will be given the opportunity to gain competency by completing remedial course-related work, assigned by the instructor. Completing the remedial work in a satisfactory fashion establishes the student's competency in the corresponding LSM but does not affect the student's grade. However, if the remedial work is not completed in a satisfactory fashion the student will automatically receive the grade F in the course.

Note 5: Math foundation extra credit consists of two components: attending lectures and solving problems sets.

- 1% extra credit for any student who attends at least seven math foundation lectures,
- 1% extra credit for any student who receives an average grade of 85% or more on math foundation problem sets.

Math foundation lectures are given by **Maxine Xiu** <maxine.xiu@colostate.edu>. You will be invited to join the Canvas course for Math Foundation.

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## Course Topics:

- LSM1. Complex-frequency spectrum analysis of continuous-time signals and systems (Laplace-transform)
  - The Laplace transform
  - Region of convergence
  - The inverse Laplace transform
  - Properties of the Laplace transform
  - Transfer function
  - Causality and stability
- LSM2: Spectrum analysis of discrete-time signals and systems (Z-transform)
  - The z-Transform
  - Region of convergence

- The inverse z-transform
- Properties of the z-transform
- Transfer function
- Causality and stability
- LSM3: Filtering and modulation
  - Double Sideband Modulation
  - Butterworth filters
  - Chebyshev filters
  - Bilinear transform
- LSM4: Computing for spectrum analysis
  - Fast Fourier transform
  - Spectrum analysis over a finite time window
  - Spectrum analysis with a finite number of samples
- LSM5: Noise
  - Random processes
  - Autocorrelation and power spectral density
  - Wide-sense stationary processes
  - White noise
  - White noise stationary processes through LTI systems

### Use of Online Homework Helper Sites:

Online “homework helper” sites including, but not limited to Chegg, NoteHall, Quizlet, and Course Hero, Koofers, are meant as study resources to help students better understand basic concepts covered in their courses. They are not intended to do homework/exams from this course for you. The use of such online resources is not permitted for solving homework and exam problems in this course. Your homework and exam submissions must be your independent work. In addition, you are not allowed to post or share homework problems and or exams (in full or in part) from this course to such websites.

### Important information for students on COVID-19:

**All students are required to follow public health guidelines in any university space, and are encouraged to continue these practices when off-campus(es). Students also are required to report any COVID-19 symptoms to the university immediately, as well as if they have potentially been exposed or have tested positive at a non-CSU testing location. If you suspect you have symptoms, please fill out the COVID Reporter (<https://covid.colostate.edu/reporter/>). If you have COVID symptoms or know or believe you have been exposed, it is important for the health of yourself and others that you complete the online COVID Reporter. Do not ask your instructor to report for you; if you report to your instructor that you will not attend class due to symptoms or a potential exposure, you are required to also submit those concerns through the COVID Reporter. If you do not have access to the internet to fill out the online COVID-19 Reporter, please call (970)491-4600.**

If you report symptoms or a positive test, your report is submitted to CSU’s Public Health Office. You will receive immediate, initial instructions on what to do and then you will also be contacted by phone by a public health official. Based on your specific circumstances, the public health official may:

- choose to recommend that you be tested and help arrange for a test
- conduct contact tracing

- initiate any necessary public health requirements or recommendations and notify you if you need to take any steps

If you report a potential exposure, the public health official will help you determine if you are at risk of contracting COVID. For the latest information about the University's COVID resources and information, please visit the **CSU COVID-19 site** (<https://covidrecovery.colostate.edu/>).