University of Nevada, Las Vegas
Department of Electrical and Computer engineering

EE 480 Digital Signal Processing

Laboratory

Prepared and Revised by

Ming Zhu

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Overview

Class meets: Thursday 8:30:am – 11:15am at TBE-B348
Class materials website: http://eelabs.faculty.unlv.edu/

Instructor: Ming Zhu
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Office Hours: email appointment

TA: Kamala Narayanan narayana@unlv.nevada.edu

Introduction

This lab courses will introduce you to various communication system designs with relatively low complexity, helping you better understand what you have learned during corresponding lecture classes. Practice on various communication models, modulation/demodulation, etc. will be conducted through a modularized implementation method. Finally, a comprehensive final project (including principle, modelling, simulations and implementations) is required to demonstrate what you have learned in this class as well as in the lecture.

Course Outcomes

Upon completion of this course, students will be able to:

1. Properly use test equipment commonly encountered in a laboratory setting
2. Use sampling techniques to study LTI systems
   a. Determine the sampling constraints necessary for signal reconstruction without aliasing
   b. Use up- and down-sampling of signals in multi-rate system to improve signal processing
3. Design IIR and FIR digital filters
   a. Transform continuous-time filters into discrete-time IIR filters
   b. Use windowing techniques for FIR filtering
   c. Implement filters using computational software to solve real problems
4. Represent a finite length sequence by its discrete Fourier transform and compute the fast Fourier transform

Grading:

Attendance and in-class experiment completion	30%
Postlabs	45%
Final project	25%
Total	100 %

Lab Schedule

Week (Date)		Lab #	Topic
1	08/29/24	0	Introduction & Lab Safety
2	09/05/24	1	Sequences and Elementary Signals
3	09/12/24	2	Working with Python
4	09/19/24	3	Convolution
5	09/26/24		
6	10/03/24	4	Fourier Transform & FIR Filters
7	10/10/24	5	Other Basic Filters
8	10/17/24	6	Introduction to Simulink
9	10/24/24	7	Sampling
10	10/31/24	8	IIR Filters
11	11/07/24	9	FFT
12	11/14/24	10	Final Project
13	11/21/24	Final project presentation	
14	11/28/24	Thanksgiving Day	
15	12/05/24	Study Week	
16	12/12/24	Final Exam Week	

Requirements

This class is comprised of about 10 laboratory exercises, as scheduled above but is subject to change upon the lecture progress. Instruction videos will be uploaded at Webcampus Ponapto Recordings so that you can watch videos any time in the week.

Most labs require a laboratory write-up (Postlab), including screenshots/photos of critical steps (e.g. codes, circuit diagrams, simulation results, descriptions and analysis) and answering the questions at the end. A postlab report should be your future reference and able to remind you of the key principles/operations in the experiment. The due date is one week after regular lab hours. For example, since EE 480L is scheduled on Thursday, the Postlab is **due on next Wednesday midnight 11:59pm.**

A course/lab related final project is required by the end of the semester. Presentation and demonstration should be performed on November 21, 2024 in class.

Course syllabus/contents and guidelines for the lab reports are posted on the class website. You must follow the guidelines and use templates for Postlabs, if you wish to get the full credit for the lab report. Please carefully read lab experiment handout. Any ambiguity encountered should be brought to the attention of the instructor and TA immediately.

All lab reports are due within a week after the experiment in softcopy (only .doc, .docx, .pdf are accepted) through UNLV Webcampus. Full grade for each report is 10pts. Late submissions will receive 1 pt off every week, as in the following table. Submissions after the Friday of the study week will NOT be accepted and will be counted as 0 pts.

Exceptions: If UNLV Webcampus is down or proper reason is justified, please submit reports to TA through email and

copy to me. No hardcopy is necessary.

Submission	Grade for each Postlab report (maximum, not counting bonus)
On due	10
Late within 1 week	9
Late within 2 weeks	8
Late within 3 weeks	7
Late within 4 weeks	6
By the Friday of study week	5

Prelabs/Postlabs file names syntax:

EE480L_RebelMailID_postlab_X.pdf. X is the number of the lab the Postlab is related to. All letters lowercase. Similar rule applies to prelab naming syntax. Example for John Smith's Postlab for Lab 1:

EE480L_smithj_postlab_1.pdf

If the submission instruction states that the project files are required in the submission, then either:

- zip all the files and attach the project files as one zip archive
- zip all the files and send the link to the shared folder (such as Dropbox, Google Drive, etc.)

Zip file with project files must follow the same naming convention as PDF files.

Examples of inappropriate submissions:

- Incorrect format, no template: -20% of points (2pts)
- Incorrect file name: -10% of points (1pt)
- Unreadable content: -50% of points (5pts)
- Screenshots/Pictures without reasonable explanation/descriptions -30% of points (3pts)

Help

TA is available through emails and WebCampus to answer all questions regarding the labs and should be utilized often. In addition, Lab Directors are always available to answer any questions. We usually check our emails at least once a day. Online resources (e.g. Google, Wikipedia, etc.) and fellow students are also useful sources of information and help. However, all report work, including Prelabs and Postlabs ***must*** be performed and turned in **individually**. Make sure you complete the lab experiments before submitting the Postlab reports. We do **NOT** allow **plagiarism**. Copied works will be counted as 0 pts for both submissions.

On rare occasions, it may be necessary to miss a lab class. With a valid excuse, a make-up session can be arranged.

To help facilitate your learning process, please provide written feedback in a timely manner to help us modify lab experiments as necessary.

Public Health Directives

- Face coverings are currently optional for all faculty and students in the classroom.

- Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at Health Requirements for Returning to Campus. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the UNLV Student Conduct Code, including being administratively withdrawn from the course.

- Information about COVID-19 reporting may be found here (https://www.unlv.edu/coronavirus/reporting).