EE482/682: DSP APPLICATIONS

COURSE INTRODUCTION

http://www.ee.unlv.edu/~b1morris/ee482

CLASS WEBSITE

- http://www.ee.unlv.edu/~b1morris/ee482

- This will have the most up-to-date information about the class
  - Weekly schedule
  - Tentative dates for exams
  - Homework assignments

- Syllabus – Full course description online

WEBCAMPUS USAGE

- Gradebook for tracking
- Homework submission
- Exam submission
- Panopto – video lectures, watch before class
- WebEx – in-class discussion, come with questions

- Will need to use some sort of scanning app to convert from handwritten paper to electronic pdf

INSTRUCTOR

- Dr. Brendan Morris
- Office: SEB 3216
- Office Hours (TBD)
  - TTh 15:00-16:00
  - Email for appointments at other times via WebEx/Google Meet
  - Best contact is email brendan.morris@unlv.edu

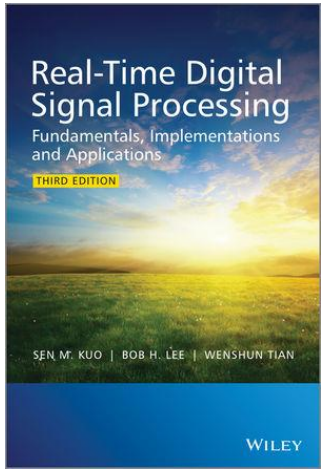
- At UNLV since 2011
- Mostly teach EE courses but research is in Computer Vision (CS area mainly)

IMPORTANT DATES

- Discussion Lecture (Q&A)
  - WM 16:00-17:15, **Mandatory In-Person**
- Final
  - Mo May 09 18:00-20:00
  - Look up your final exam schedule now to determine conflicts
- Quizzes (5) will be scheduled throughout the semester
- Note: exams will be taken at home and will not be at a fixed time but during a submission window
  - Open book, open notes

TEXTBOOKS

- Real-Time Digital Signal Processing: Fundamentals, Implementations, and Applications, 3rd Edition, Kuo, Lee, Tian, 2013. ISBN: 978-1-118-41432-3



- Recommended References
  - The Scientist and Engineer's Guide to Digital Signal Processing, Smith [online]
    - http://www.dspguide.com/pdfbook.htm
  - Digital Image Processing, 3rd Edition, Gonzalez and Woods, 2008

- See webpage for more resources

GRADING

- Final: 20%
- Quizzes (5) 25%
- Project 25%
- Homework 30%

- Grading Scale – do not trust Webcampus %
  - Grades follow the typical scale but is curved such that the average grade is around a C+/B-
  - The curve can only help you

HOMEWORK

- One homework assignment every other week based on specific topic
  - Will have handwritten and Matlab programming questions
- Homework will be due as indicated on Webcampus. No late homework will be accepted unless prior notification and arrangements are made.
- Student may work together in study groups but all assignments must be completed individually

- Start early
  - Give yourself plenty of time to work through problems completely and get answers to questions before submission
  - Avoid technical glitches → use phone scanning app

PROGRAMMING

- Course will teach using Matlab (but not use not required)
  - Available on campus computers [link]
    - Must have an ACE account
    - http://oit.unlv.edu/accounts/computing-account
  - Student copy is affordable ($99) and very useful
    - https://www.mathworks.com/products/matlab/student.html
    - Includes Signal Processing and Image Processing Toolboxes among others
  - Many tutorials are available online
    - https://matlabacademy.mathworks.com/
- Recommend free alternatives
  - Octave – open Matlab clone that is good for most basic tasks
  - Python – highly recommended as the way to go now (pair with science libraries such as NumPy, SciPy, Matplotlib)
    - Use virtual environments – Python venv or Anaconda/miniconda

EXAMS

- Quizzes
  - 5 Short exams given at the end of important modules – every ~3 weeks
  - Open book, open notes
- Will be administered through Webcampus
  - Must scan/photo work to submit → use document scanning app
  - Must show all work in order to receive points

- Exams will be open over a window of a few days
  - Do not use any outside material or talk to your friends until after the exam period is closed
  - If you wouldn't do it at an in-person exam, you should not do it here

PROJECT

- Emphasis this semester on Bosch Future Mobility Challenge
  - 1:10 scale self-driving car
- Grading based on presentation and report

LECTURES AND READING

- Pre-recorded lecture notes will be made available through WebCampus using the Panopto Recordings navigation link
  - Will have captions and text search
- In-class meetings will be recorded through WebEx

- Reading the book actually helps
  - Please come prepared to class having read content
  - Ask questions during the in-class time

TOPICS

- **General**
- DSP fundamentals
- Design and implementation of filters
- Frequency domain analysis of signals
  - DFT, FFT, spectral analysis
- Speech signal processing
- Audio processing
- Image processing
  - Special emphasis in this domain
- Radar/Lidar processing

- **BFMC**
- Sensors for environmental sensing
- Computer vision for object/obstacle detection
- Vehicle control
- Simulation and testing

POLICIES

- As a university student it is your responsibility to conduct yourself ethically and with integrity as described in the Academic misconduct Policy. Cheating and plagiarism will not be tolerated. Any student caught cheating will be given an F grade. (http://studentconduct.unlv.edu/misconduct/policy.html)

A RESPECTFUL VIRTUAL ENVIRONMENT

- Covid-19 poses challenges for us all, please let me know if you have any issues
- We are all in this together, let's help one another succeed together
- There are no dumb questions. Only by asking will you get your questions answered
- Everyone is in a different place, we must have a safe environment for participation
- I expect we will all interact respectfully with one another

TIPS FOR SUCCESS

- **Participate**: Attend discussion session and take part.
- **Practice**: Spend ample time on homework and other problems.
- **Question**: Do not be afraid to ask questions.
- **Network**: Find people taking the same courses as you and build study groups.
- **Review**: Don't just do what is asked in class.
- **Be RESPONSIBLE**: You are an adult and must be responsible for your academic career.

QUESTIONS?