Introduction to Signal Analysis

ECE 201

Fall 2019

Instructor Dr. B.-Peter Paris
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Time and Place Tuesday and Thursday, 10:30-11:45am, Exploratory Hall, room L004.

Office Hours Tuesday 2:00-3:00 pm and Wednesday 1:00-2:00 pm or by appointment.

Course Goals This course introduces students to key concepts in Electrical Engineering, including the description of signals in the time and frequency domains. Students will learn the fundamental role played by sinusoidal or complex exponential signals for connecting these domains. Students will learn properties of signal processing systems, including linearity and time-invariance, and the operation of linear, time-invariant systems in the time and frequency domains.

Required Textbook J.H. McClellan, R.W. Schafer, and Mark A. Yoder, *DSP First -Second Edition,* Pearson, 2016.

Lab Four lab sections meet once a week in the Engineering Building. Lab experiments are designed and intended to complement material discussed in class. Students are expected to be well prepared for the lab sessions to maximize the use of time in the lab.

Recommended Further Reading `https://www.mathworks.com/help/matlab/`

Homework will be assigned every week and is due the following week. You are permitted and encouraged to work on the assignments in small groups; however, each student must submit a *unique* and *original* homework.

Multiple Quizzes, two Midterm Exams and a Final Exam will be given during the semester. Quizzes will not be announced and may be given at any time during the class. Make-up exams are rarely given unless prior

arrangements have been made. In case of an emergency, contact the instructor as soon as possible and always *before* the exam. Failure to take an exam, will result in no credit for the exam.

All exams are conducted under the rules and regulations of the **Honor Code** (see University Catalog).

Teaching Assistants

- Lab Instructors: Zheng Wang (zwang23@gmu.edu), Bhargabi Chakrabarti (bchakra@gmu.edu), and Joe Coffin (jcoffin2@gmu.edu)
  Office Hours: see syllabus for the lab.

- Grader: Zheng Wang (zwang23@gmu.edu) and Bhargabi Chakrabarti (bchakra@gmu.edu)
  Office Hours: TBA.

On-line Class Material Class and lab material will be distributed electronically via the World-Wide Web. Use a browser to find the ECE 201 homepage at URL:
`http://www.spec.gmu.edu/~pparis/classes/ece201.html`. I will also correspond with you through your Mason e-mail account - check your e-mail regularly. The BlackBoard page for this course will contain homework assignments, syllabus, and your grades.

Final Grades are determined by a weighted average of homeworks, projects, exams, and labs in the following manner:

Homework and and quizzes	20%
Midterm Exams	15% each
Final Exam	30%
Labs	20%

Academic Integrity Mason is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. When in doubt (of any kind) please ask for guidance and clarification.

Mason E-mail Accounts Students must use their MasonLIVE email account to receive important University information, including messages related to this class. See `http://masonlive.gmu.edu` for more information.

Office of Disability Services If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. `http://ods.gmu.edu`.

Other Useful Campus Resources

- University Libraries "Ask a Librarian " `http://library.gmu.edu/ask`.
- Counseling and Psychological Services (CAPS): (703) 993-2380; `http://caps.gmu.edu`

University Policies The University Catalog, `http://catalog.gmu.edu`, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at `http://universitypolicy.gmu.edu/`. All members of the university community are responsible for knowing and following established policies.

Class Schedule

Week 1: Introduction to DSP; Sinusoids, delay and phase

Week 2: Sinusoids and complex exponential signals

Week 3: Phasors and phasor addition

Week 4: Sums of sinusoids, spectrum representation

Week 5: Beat notes and amplitude modulation

Week 6: Fourier series and Midterm 1

Week 7: Sytems, linearity and time-invariance

Week 8: convolution and LTI systems, FIR filters, convolution examples

Week 9: Frequency response of LTI systems

Week 10: Frequency response examples, filtering in the frequency domain

Week 11: Midterm 2 and Discrete Time Fourier Transform (DTFT)

Week 12: Discrete Fourier Transform (DFT)

Week 13: Spectrum analysis and Spectrogram

Week 14: Fast Fourier Transform (FFT)

Tuesday, December 17 10:30 am – 1:15 pm: Final Exam