BME 310

Biomedical Computing

**CLASS HOURS OFFICE HOURS (Fenster 611)**

Tues 8:30-9:55 Tues 11:45 to 12:45

Thurs 11:30-12:55 Recitation Friday 1:00 to 2:00

Friday 11:30-12:55Or by Appointment

Email: tara.l.alvarez@njit.edu

**TEXT**

Signal Processing First, McClellan, Schafer & Yoder

ISBN: 0130909998

Supplemental handouts will be provided as needed.

**Course Material:** available at <http://web.njit.edu/~alvarez/classes.htm> Password njitbme

**Course Description**

Prerequisites: BME 301 and Math 112. This course covers the application of digital signal

processing to biomedical problems. Labview, a graphical programming language common

in engineering, is used for both signal acquisition and processing. Applications include

analysis of the electrocardiogram and other electrical signals generated by the body

**LEARNING OUTCOMES**

By the end of the course you should be able to do the following:

1. **Digital Signal Processing:** Understand the fundamental principles of digital signal processing**.** In particular, gain knowledge in Fourier Series, Fourier Transforms, FIR, Frequency Response, and Sampling. Apply knowledge of math, engineering and science to identify, formulate, and solve problems in these areas.
2. **Data Interpretation:** Learn to utilize Labview software to design and analyze data. Apply knowledge of math, engineering and science to interpret data. Develop an understanding of and develop the skills necessary to communicate findings and interpretations in an effective laboratory report.
3. **Biomedical Signal Processing:** Apply knowledge of math, engineering and science to understand the principle of biomedical signal processing. Understand how to apply specific mathematical techniques to solve problems in the areas of biomedical signals.
4. **Work in Multi-disciplinary Teams:** Learn to work and communicate effectively with peers on multi-disciplinary teams to attain a common goal.

**COURSE OUTLINE\***

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| --- | --- | --- | --- | --- |
| **Class** | **Date** | **Chapter In Text** | **Subject** | **HW** |
| Week 1 | 1/18/11 | 1 & 2 | Introduction / Sinusoids | See notes |
| Week 2 | 1/25/11  | 2 | Sinusoids | See notes |
| Week 3  | 2/1/11  |  3 | Spectrum Representation | See notes |
| Week 4 | 2/8/11 | 3  | Spectrum Representation | See notes |
| Week 5 | 2/15/11 | 4  | Sampling and Aliasing  | See notes |
| Week 6 | 2/22/11 |  4 |  Sampling and Aliasing | See notes |
| Week 7 | 3/1/11 |  5 |  FIR Filters | See notes |
| Week 8 | 3/8/11 | 5 |  FIR Filters | See notes |
| Week 9 | 3/15/11 | Spring Break |
| Week 10 | 3/22/11 |  6 |  Frequency Response of FIR Filters | See notes |
| Week 11 | 3/29/11 |  6 |  Frequency Response of FIR Filters | See notes |
| Week 12 | 4/5/11 |  10 |  Frequency Response | See notes |
| Week 13 | 4/12/11 | 10 |  Frequency Response | See notes |
| Week 14 | 4/19/11 | 13 |  Computing the Spectrum | See notes |
| Week 15 | 4/26/11 | 13 |  Computing the Spectrum | See notes |
| Week 16 | 5/3/11 |  | Final to be Announced |  |

**Exam 1 tentatively 3/1**

**Exam 2 tentatively 4/5**

**Final to be announced**

**\*The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline and schedule of studio/ laboratory sessions.**

**Grading:**

|  |  |
| --- | --- |
| **Item** | **Percentage of Grade** |
| Exam 1 | 25% |
| Exam 2 | 25% |
| Laboratory Reports and Participation | 15% |
| Homework | 5% |
| Final | 30% |
| Total | 100% |

Attendance is mandatory. Failure to attend class regularly will result in a failing grade.

No makeup examinations will be administered. If a valid, documented excuse for a missed exam is provided, the weight of the Final Exam will increase to compensate for the missed grade.

**Assignments:** You are responsible for all weekly reading, homework assignments and laboratory experiments. The reading should be completed BEFORE class each week. Homework and Laboratory Reports are due one week after the assignment. All assignments, homework, laboratory reports, and exams must be completed by due date. There are no late exams and any homework or reports handed in late will receive a zero.

**Honor Code Violations/Disruptive Behavior:**

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted.

No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories.

Cellular phones must be turned off during the class hours.