

Geophysical Data Processing GE572 – Spring 2010

Professor Alan Kafka
Department of Geology and Geophysics, Boston College
Office Hours - W 1:30-2:30 and Th 1:30-2:30, Devlin 312
E-mail: kafka@bc.edu, Web Site - www2.bc.edu/~kafka

Lecture: T Th 4:30-5:45

Description of Course: This course covers the fundamental principles underlying methods that are commonly used to analyze digital signals. Methods of signal processing that are used in geophysical applications will be emphasized, but these same methods are also used in a wide variety of science and engineering applications. Homework assignments will give the students practice in applying the principles that are developed in the course.

Textbook: *Signals and Systems* by Alan V. Oppenheim, Alan S. Willsky, and S. Hamid Nawab, Second Edition.

Grades: Course grades will be based on homework assignments (given out every few weeks), a research project, two exams during the semester, and a final exam. Grades will be determined as follows:

Average of grades on homework assignments (~30%)
Research project reports (~30%)
Exam grades (~40%)

Course Outline: The following topics will be covered:

- Chapter 1 – Signals and Systems
- Chapter 2 – Linear Time-Invariant Systems
- Chapter 3 – Fourier Series Representation of Periodic Signals
- Chapter 4 – The Continuous-Time Fourier Transform
- Chapter 5 – The Discrete-Time Fourier Transform
- Chapter 6 – Time and Frequency Characterization of Signals and Systems
- Chapter 7 – Sampling
- Chapter 9 – The Laplace Transform
- Chapter 10 – The z-Transform
- Additional Topics to be Announced

Research Project: For this course, you will be required to conduct a research project that involves processing digital signals and analyzing the results. Your work on this research project will involve one or more research reports during the semester and a Final Research Report (due at the end of the semester).