EEL4140 - Filter Design

Three Credits, Four and a half hours, Engineering Topic

Instructor: Dr. Frank Urban.

Textbook: Design of Analog Filters by Schaumann & VanValkenburg

Specific Course Information: Approximation techniques. Active RC second order modules. Low pass filters, band pass filters, high pass filters, notch filters are studied in detail. Sensitivity and high order filters. Design and laboratory implementation.

Specific Goals for the Course

a. Specific outcomes of instruction

Upon successful completion of this course, the student will:

1. Learn characteristics of standard filters

2. Learn to translate system requirements into filter specifications

3. Learn how to design different types of filters

4. Learn how to cascade filter sections to create higher order filters

5. Learn to engineer with component variability

6. Learn to use Matlab to solve filter problems.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

In this course the student will have to show

(a) an ability to apply knowledge of mathematics, science, and engineering (X)

(b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (X)

(c) an ability to design a system, component, or process to meet desired needs (X)

(d) an ability to function in multi-disciplinary teams (N/A)

(e) an ability to identify, formulate, and solve engineering problems (homework) (X)

(f) an understanding of professional and ethical responsibility (N/A)

(g) an ability to communicate effectively (through project reports) (X)

(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (N/A)

(i) a recognition of the need, and an ability to engage in life-long learning (N/A)

(j) a knowledge of contemporary issues (N/A)

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (X)

(l) a knowledge of probability and statistics (N/A)

Brief list of the topics to be covered

1. Matlab for filter analysis and design

2. Operational Amplifiers in filters

3. 1st and 2nd order filters

4. Notch filters

5. Cascade designs, Butterworth filters

6. Chebyshev and elliptic filters

7.Delay

8.LC ladder and switched capacitor filters

GRADING:

Course Requirements	Weight
Exam1	20%
Exam2	20%
Quizzes	20%
Homework	40%
Project	25%
Overall Grade	100%

Conversion of Numerical Grade to Letter Grade

95<=A<=100	80<=B<84	65<=C<69
90<=A-<94	75<=B-<79	60<=D<64
85<=B+<89	70<=C+<74	F: Below 60