

## ESE 547 Fall 2009; November 4

Class	Topics	Sections	Reading
10	Calculation of Filter Order	4.4.2	
	Analog Spectral Transformations	4.5	Sec. 9.5
	Magnitude-Squared Characteristics	4.4	Secs. 4.4.1, 4.4.6
	Sampling	4.2.1, 4.3.1	Sec. 4.1
	Frequency Domain effect of Sampling	4.2.1, 4.3	Sec. 4.7

### Homework:

1. If, in a system with a sampling rate of 10kHz, we require that a low-pass filter have a stop-band extending from 2.5kHz up, that the passband be 0 – 2kHz with gain error at most 1%, and that the stopband rejection be at least 60dB, find analytically what order filter would be needed with a Butterworth filter prototype, and check your result against the result from MATLAB.
2. (MATLAB homework) In a system with sampling frequency 88.2kHz, a lowpass filter is needed with the following specifications: passband 0 – 20kHz, with at most 1% gain error; stopband 24.1kHz up, with at least 60dB rejection. Use MATLAB to find the coefficients of such a filter using the Bilinear transform with Butterworth, Chebyshev type I, Chebyshev type II, and Elliptic prototypes.
3. Chapter 4: Problems 22, 30, and 31, pp. 229 – 230. (For the previous edition, try Chapter 5, problems 17, 23, and 24, p. 355.)
4. (MATLAB homework): Problems M9.1, M9.5, and M9.8, p. 521. (Use the bilinear transform only for all problems.) (For the previous edition, try problems M7.2, M7.5, and M7.8, p. 510. (Again, use the bilinear transform only for all problems.))