WASHINGTON STATE UNIVERSITY
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School of Engineering and Computer Science

ECE 414: Introduction to Digital Signal Processing
Master Syllabus

Catalog Data:	**ECE 414: Introduction to Digital Signal Processing**; 3 credits (2-3) Discrete and fast Fourier Transforms, Z-Transform, sampling, discrete convolution, digital filter design and effects of quantization. Typically offered Fall .
Class Schedule:	Two lecture hours per week, for one semester.
Laboratory Schedule:	One 3-hour lab session per week, for one semester.
Prerequisites by Course:	ECE 341
Prerequisites by Topic:	Understanding of the frequency domain, Laplace and Fourier transforms
Typical Text:	*Discrete-time Signal Processing*, Oppenheim, Schafer and Buck, 3rd Edition, Prentice Hall, 2010. *Digital Signal Processing, Principles, Algorithms, and Application*, John G. Proakis, Dimitris G. Manolakis, 4th Edition *Digital Signal Processing using MATLAB*, Vinay K. Ingle and John Proakis, 3rd Edition, Cengage Learning, 2007.
Course Coordinator:	Dr. Aref Majdara
Course Objectives:	Students will: 1. Represent and analyze discrete time linear signals and systems in the time and frequency domains. 2. Apply the Z-Transform and discrete Fourier transform digital signal processing, including digital filter specification, design, implementation, and testing. 3. Perform the discrete Fourier Transform of a sampled signal based on the knowledge of the Continuous Fourier Transform, including understanding the sampling theorem and the concept of aliasing. 4. Apply the concepts of convolution and correlation.
Topics Covered:	1. Discrete-time signals and systems review 2. Sampling 3. Multirate Signal Processing 4. Z-Transforms 5. Inverse Z-Transforms 6. Discrete Fourier Transforms 7. Fast Fourier Transforms 8. FIR and IIR Filters
Lab Experiments and Activities:	Laboratory sessions will extensively involve MATLAB examples and problems supplementing the theory discussed in the class.

Course Outcomes:	Students will be able to:			
	Assessed for Student Outcomes	1-d. Determine the Z-transform of the signal and compute and sketch the magnitude and phase spectra of signals. 6-a. Be able to apply Discrete Fourier Transforms for signals with specific requirements. 6-b. Use simulation software MATLAB to analyze and process the signals.		
	Other	2-b. Apply methods such as linear and circular convolution, Z and Discrete Fourier Transforms to convert signal to frequency domain for signal analysis. 2-c. Apply Fast Fourier Transform to save the computation resources. 3-a. Write lab reports based on MATLAB simulation results. 7-a. Analyze signals (such as speech, image and radar signal) and implement signal processing for course project.		
Relationship of Course to Program:		Meets: Educational Objectives: 1, 2, 4 Student Outcomes: 1, 2, 3, 6, 7		
Prepared by:			Date:	Oct. 5, 2011 reviewed 09/17 3/21/18 (mb); 8/31/21