

1. ECE/MATH 430: Fourier and Wavelet Analysis with Apps
2. 3 credits: 3-50 minute lecture sessions/week
3. Ali Pezeshki; Olivier Pinaud
4. Fourier Analysis and Applications: Filtering, Numerical Computation, Wavelets. Gasquet, C. & Witomski, P. 1998.
5. Course Information
 - a. Fourier analysis and transforms, FFTs; sampling theorems, computational algorithms; wavelets; applications to communication, imaging, and compression
 - b. Prerequisites: MATH340 or MATH 345
 - c. Selected Elective: Electrical Engineering; Computer Engineering; Lasers & Optical Engineering
6. Goals for the Course
 - a. Course Learning Objectives
 - i. Reproduce connections between these transforms along with sampling theorems and Poisson summation formulas
 - ii. Complete more general transforms, in particular the Gabor and wavelet transforms
 - iii. Apply fast Fourier transform and wavelet algorithms to spectrum analysis, imaging, and compression of sound and image files
 - b. Student Outcomes
 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
7. Topics Covered
 - Signals & Systems
 - Filters and Transfer Functions
 - Trigonometric Polynomials
 - Periodic Signals and Fourier Series
 - Pointwise Representation
 - Multidimensional Fourier trans-forms and wavelets
 - Sound processing using Fourier Transform, Laplace Transform, Parseval's Identify
 - Continuous line Fourier series
 - Discrete-time Fourier transform
 - Discrete Fourier transform