(3-0-0; ——) **Discrete Time Series Analysis** STAT-464*

Many systems evolve with an inherent amount of randomness in time and/or space. The focus of this course is on developing and analysing methods for analyzing time series. Because most of the common time–domain methods are unreliable, the emphasis is on frequency–domain methods, *i.e.* methods that work and expose the bias that plagues most time–domain techniques. Slepian sequences (discrete prolate spheroidal sequences) and multi–taper methods of spectrum estimation are covered in detail with examples from science and engineering problems.

Textbook: *Notes and Selected Reading*
(Recommended) *Spectral Analysis for Physical Applications; Multitaper and Conventional Univariate Techniques*
by D. B. Percival and A. T. Walden (Cambridge University Press, 1993)

Prerequisite: MATH-335* *or* 338* *and* MATH-251* *or* STAT-261* *and* MATH-312*.

Instructor: D. J. Thomson

Evaluation:		
	Take Home Examination	20%
	Midterm Test	40%
	Assignments	40%

Outline:

- Introduction to Time Series
- Review of Fourier Transforms and the FFT
- Prediction Problems and Harmonic Processes
- Stationary Processes and the Spectral Representation
- Classical Spectrum Estimates
- Slepian Sequences
- Multitaper Estimates
- Tests for Periodic Terms
- Bivariate Processes and Coherence
- Design of Data Collection and Analysis Procedures
- Nonstationary Processes and Additional Topics