

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: EGR 261

Credits: 3

Course Title: Signals and Systems

Course Description (including lecture hours, lab hours, total contacts)

Presents the concept of linear continuous-time and discrete-time signals and systems. Covers topics including Laplace transforms and Laplace transform analysis of circuits, time and frequency domain representation of linear systems, methods of linear systems analysis including convolution and Laplace transforms, frequency domain representation of signals including frequency response, filters, Fourier series, and Fourier transforms. Utilizes online data and related computational analysis support to assist with the representation, analysis and applications of signals and systems models. Other topics covered: differential and difference equations, signal modulation and demodulation, Fourier analysis of discrete-time systems, Parseval's theorem, ideal filters, sampling, Laplace Transfer Function representation, and introduction to the z-Transform. Lecture 3 hours per week.

General Course Purpose

This is a second-year Engineering elective in the JSRCC Engineering Transfer (AS Degree) curriculum, intended for students who wish to transfer to a major university to pursue a BS Degree in Electrical or Computer Engineering. The course content (along with the required companion lab course as a co-requisite) is intended to be sufficient to transfer either as an equivalent course into four-year Engineering programs with a single Signals and Systems course (such as ODU for EE or CPE or VT for CPE), or as the first course of a two-course Signals and Systems sequence for EE (VT, VCU).

Course Prerequisites/Corequisites (*Entry-level competencies **required** for enrollment*)

Prerequisites: EGR 124 or equivalent, EGR 251 or equivalent. Corequisites: MTH 279 or equivalent and the companion lab course for EGR 261, which is EGR 295: Signals and Systems Laboratory.

Course Objectives (Each item should complete the following sentence.)

Upon completing the course, the student will be able to:

- understand the concept of linear systems
- understand system definitions and properties, such as linearity, causality, time invariance and stability
- understand the concept of continuous and discrete-time signals
- understand how to model the behavior of continuous and discrete-time systems using differential equations and difference equations
- understand how to convolve continuous-time and discrete-time signals
- use Fourier Series and Fourier Transforms to analyze signals and systems
- use Laplace transforms and the Transfer Function representation to analyze system response
- understand the purpose and uses of the z-Transform

Major Topics to be Included

- Fundamental concepts
- differential and difference equations
- convolution representation of continuous-time systems
- Fourier Series and Fourier Transform
- signal modulation and demodulation
- Fourier analysis of discrete-time systems
- ideal filters, sampling
- Laplace Transform and Transfer Function representation
- introduction to the z-Transform

Effective Date of Course Content Summary (Month, Date Year): January 1, 2008