1. *Course number and name*
   ENGR 315: Systems Analysis Laboratory

2. *Credits and contact hours*
   1 credit hours; one 2-hr-45-minute laboratory session/week

3. *Instructor's or course coordinator's name*
   Instructor: Tom Holton, Instructor
   Course coordinator: Tom Holton, Professor of Electrical and Computer Engineering

4. *Text book, title, author, and year*
   none

   a. *Other supplemental materials*
      Holton, T. *ENGR 315 Website*.All laboratory exercises and pre-lab information is available online at ://www.sfsu.edu/~ee/315. The username and password are given at the first lecture.

5. *Specific course information*
   a. *Brief description of the content of the course (catalog description)*
      Laboratory exercises on signals and systems in the time and frequency domains. Linearity and time invariance, causality and stability.Time-domain solutions of differential equations.Impulse response.Convolution. Fourier series and Fourier transform methods. Laplace transforms. System functions, Bode and pole-zero plots. System stability.Sampling theorem.

   b. *Prerequisites or co-requisites*
      ENGR 305: Systems Analysis (may be taken concurrently).

   c. *Indicate whether a required, elective, or selected elective course in the program*
      Required for Electrical Engineering

6. *Specific goals for the course*
   a. *Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*
      - Students will demonstrate the ability to use Matlab to plot signals in the continuous-time domain.

- Students will demonstrate the ability to use Matlab to verify theoretical solution of linear differential equations in response to impulse and step inputs.
- Students will demonstrate ability to use Matlab to plot convolution of two functions.
- Students will demonstrate the ability to use Matlab to determine and plot Fourier series and Fourier transform of functions.
- Students will demonstrate the ability to use Matlab to determine and plot Laplace transforms and inverse transforms.
- Students will demonstrate the ability to use Matlab to determine the system function, Bode plots and pole-zero plots.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
Course addresses ABET Student Outcome(s): a, b, c, e, k.

7. Brief list of topics to be covered

- Introduction to Matlab
- Introduction to basic concepts of signals and systems.
- Characterization of continuous-time signals.
- Linearity and time invariance.
- Time-domain methods of analysis of linear systems. Impulse response. Convolution.
- Time-domain solutions of differential equations.
- Fourier series and Fourier transform methods.
- Applications of Fourier transforms: sampling theorem, modulation
- Laplace transform
- System functions. Bode plots. Pole-zero plots.