1. **Course number and name**
   EE 352: Electrical Engineering Laboratory I

2. **Credits and contact hours**
   3.0 (one lecture hour and six laboratory hours per week)

3. **Instructor's or course coordinator's name**
   Ben Belzer

4. **Text book, title, author, and year**
   National 43-648 lab notebook or equivalent.
   Other supplemental materials
   G.W. Roberts and A.S. Sedra. 1996. *SPICE* (2nd ed.). Oxford University Press.
   S. Wolf and R.F.M. Smith. 2004. *Student Reference Manual for Electronics Instrumentation Laboratories* (2nd ed.). Pearson Prentice-Hall, Inc, 2004.
   A.S. Sedra and K.C. Smith. 2015. *Microelectronic Circuits* (6th ed.). Oxford University Press.
   J.W. Nilsson and S.A. Riedel. 2015. *Electric Circuits* (10th ed.). Pearson Prentice-Hall.
   Online lab assignments, lecture notes, and background modules.

5. **Specific course information**
   a. *Catalog description:* Experiments in electrical circuits, measurements and electronics; principles of measurements and measuring instruments.
   b. *Prerequisites or co-requisites:* Concurrent enrollment in EE 311; EE 321 with a C or better or concurrent enrollment; certified major in Electrical Engineering, Computer Science, or Computer Engineering.

6. **Specific goals for the course**
   At the end of this course, students must be able to:
   - Use electronics lab equipment (digital multi-meters, oscilloscopes, signal generators, power supplies, capacitance/inductance meters, and curve tracers) to take circuit and device measurements (1a, 1b, 1d, 1e, 6b)
   - Work in teams of two or three to accomplish course objectives (5a, 5b, 5c, 5d)
   - Experimentally characterize key parameters of operational amplifiers, diodes, MOSFETs, and bipolar junction transistors and compare with relevant theory. (1a, 1b, 1d, 1e, 6a-c)
   - Design op-amp, MOSFET, and BJT amplifier and current mirror circuits and verify experimentally that they meet specifications. (1a, 1b, 1d, 1e, 2a, 2c, 2e, 2g, 6a-c)
   - Experimentally measure and analyze mutual inductance circuits. (1a, 1b, 1d, 1e, 6a-c)
   - Experimentally measure and analyze circuits modeled with state-space models. (1a, 1b, 1d, 1e, 6a-c)
   - Experimentally measure circuit transfer functions and compare with theory. (1a, 1b, 1d, 1e, 6a-c)

- Starting from a course project specification, design, simulate, construct, measure and analyze a system involving multiple sub-circuits, and conduct an in-person demonstration to show that the system meets specifications. (1a-e, 2a, 2c, 2d, 2e, 2g, 3a-f, 5a-g, 6a-d)
- Communicate relevant theory, design process, experimental results and analysis through written lab notebook entries and calculations, written lab reports and the interim and final course project reports, as well as through the final project demonstration. (3a-f)

7. Brief list of topics to be covered

Basic Equipment Familiarization and First Order Electrical Circuits

- State Variable Models and Mutual Inductance
- Operational Amplifier Applications
- Non-Ideal Operational Amplifier Behavior
- Diode Circuits
- Transfer Function Analysis
- MOSFET Characteristics
- MOSFET Amplifier Circuits
- BJT Characteristics
- BJT Amplifier Circuits
- Course design project