

## BME312

### Course Syllabus

1. *Department:* Biomedical Engineering      *Number:* BME312      *Credit Hours:* 1  
*Title:* Analog and Digital Circuits      *Required*  
Laboratory

2. *Course Description:*

Laboratory in analog and digital circuit analysis. Electrical safety; Exercises in resistor networks, capacitors and inductors, steady-state and dynamic circuit behavior, active circuits, amplifiers, logic gates, combinatorial and sequential circuits, elementary digital system design, A/D conversion, biomedical applications.

3. *Prerequisite(s):* MA241, PY208, ECE331

4. *Textbook(s) and/or other required material:*

Laboratory assignments will be made available via the course website

5. *Course objectives. By the end of this course, the student should be able to: (use demonstrative verbs)*

- 1.Explain principles of electrical safety;
- 2.Construct passive circuits from circuit diagrams;
- 3.Predict and measure steady-state behavior of passive circuits;
- 4.Construct active circuits from circuit diagrams;
- 5.Predict and measure dynamic behavior of active and passive circuits;
- 6.Construct digital circuits with basic logic gates and flip-flops;
- 7.Design combinatorial digital circuits from a truth table;
- 8.Predict and measure the output of an A/D converter given an input signal;
- 9.Use common circuit analysis and measurement tools such as multimeters, function generators, oscilloscopes, and digital analyzers.

6. *Topics covered (give the number of lectures per topic, as well as the total number of lectures per semester):*

- 1.Electrical and laboratory safety.
- 2.Resistor networks and impedance matching.
- 3.RLC circuits
- 4.Rectifiers and peak detection
- 5.Dynamic circuit behavior, transient and steady-state responses
- 6.Active circuit elements, transistors, diodes
- 7.Operational amplifiers
- 8.Frequency response of circuits
- 9.Signal conditioning
- 10.Digital circuits, gates, flip-flops

11. Combinatorial logic design
12. Sequential logic circuits
13. A/D conversion
14. Biomedical data acquisition from a transducer

7. *Class/laboratory schedule (sessions per week and duration of each session):*  
one 3 hour lab session per week