The BME 3512 Bioelectronics course is partitioned into essentially seven areas, divided into four tests:

**Test One - Principles of DC and AC Circuits**  
Review of Basic Concepts and Principles of DC and AC Currents and Voltages

**Test Two - (BJT and FET Transistors)**  
PN Junction and Diode Applications  
Bipolar Junction Transistors (BJTs)  
Field Effect Transistors (FETs)

**Test Three - (Operational Amplifiers)**  
Principles of Oscillators, Waveform Generators, and Small Signal Amplifiers  
Operational Amplifiers and Op-Amp Applications

**Test Four - Digital Electronics**  
Digital Electronics and Integrated Circuits (IC’s)

Students are responsible for all of the assigned reading material. Not all of the material will be covered during class lectures; nevertheless, it is considered essential to understanding the course material and for successfully achieving the course learning objectives. Students who fall behind, will most likely be left behind. It is up to you to keep current.

The main textbook, *Practical Electronics for Inventors*, 3ed by Paul Scherz and Simon Monk (McGraw Hill, 2013) is a thorough and utilitarian textbook for a hands-on electronics class such as BME 3512. Electronic theory is presented in a straight-forward, easy-to-read and to understand manner. Various chapters cover passive and active components; AC and DC circuits; filters; power supplies; semiconductors (diodes, transistors, optoelectronics); integrated electronics (operational amplifiers, oscillators, timers, voltage regulators); audio electronics; digital electronics (logic gates, sequential and combinational logic, counters, shift registers, buffers, latches, drivers, displays, memory devices); motors (AC, DC, RC servos, stepper) as well as sections on safety; wiring & grounding information; useful facts, formulas, component data; laboratory instruments/measurements; error analysis; and micro-controller circuits.

Supplementing the main textbook is Cathey & Nasar's *Schaum's Outline Of Electrical Engineering*, 2ed (McGraw Hill, 1997) which not only contains additional explanatory reading material, but also a wealth of practical problems. Each chapter includes both solved problems and supplemental problems. Answers are provided for all questions/problems. Students should feel competent in solving each type of example problem. The assigned homework problems will be used as models for exam questions. Students are encouraged to work collaboratively and to seek help from the instructor as needed. An electronic calculator is highly recommended.

The proposed schedule is tentative. The topics and subtopics are guidelines and are not meant to be restrictive or all inclusive. If necessary and at the instructor's discretion the order and timing of the topics may be altered during the course of the semester.

Reading assignments and suggested homework problems are intended to supplement the in-class lectures. See pages 2 - 5 of this document for a list of reading assignments and homework assignments arranged according to the four tests areas.

**Handy References:** *Practical Electronics for Inventors* (3ed).

- Appendix A: Power Distribution pp 953 - 958
- Appendix B: Error Analysis pp 959 - 962
- Appendix C: Useful Facts and Formulas pp 963 - 968
Review of the Principles of DC & AC Current and Voltage

Reading Assignment:


**Basic Concepts**

Chapter 1  Introduction to Electronics  Sections 1.1 - 1.5  Pages 1 - 3
Chapter 3  Basic Electronic Circuit Components  Sections 3.1 - 3.4  Pages 265 - 311
Chapter 3  Basic Electronic Circuit Components  Sections 3.9  Pages 408 - 410
Chapter 14 Hands-On Electronics  Sections 14.1 - 14.5  Pages 823 - 896

**Principles of DC Circuits**

Chapter 2  Theory  Sections 2.1 - 2.19  Pages 5 - 80
Chapter 3  Basic Electronic Circuit Components  Sections 3.5  Pages 311 - 336

**Principles of Alternating Voltages and Currents, Complex Impedance, Passive (RCL) Filters**

Chapter 2  Theory  Sections 2.20 - 2.36  Pages 80 - 242
Chapter 3  Basic Electronic Circuit Components  Sections 3.6 - 3.8  Pages 336 - 408


**Basic Concepts**

Chapter 1  Introduction to Electronics  Sections 1.1 - 1.5  Pages 1 - 3
Chapter 3  Basic Electronic Circuit Components  Sections 3.1 - 3.4  Pages 253 - 299
Chapter 3  Basic Electronic Circuit Components  Sections 3.9  Pages 397 - 399
Chapter 7 Hands-On Electronics  Sections 7.1 - 7.5  Pages 551 - 634

**Principles of DC Circuits**

Chapter 2  Theory  Sections 2.1 - 2.19  Pages 5 - 80
Chapter 3  Basic Electronic Circuit Components  Sections 3.5  Pages 299 - 324

**Principles of Alternating Voltages and Currents, Complex Impedance, Passive (RCL) Filters**

Chapter 2  Theory  Sections 2.20 - 2.36  Pages 80 - 245
Chapter 3  Basic Electronic Circuit Components  Sections 3.6 - 3.8  Pages 324 - 396


**Reading Assignment:**

Chapter 1  Circuit Elements and Laws  Section 1.3  Pages 2 - 3
Chapter 2  Analysis of Resistive Circuits  Sections 2.1 - 2.7  Pages 16 - 19
Chapter 3  AC Circuits Under Steady State  Sections 3.1 - 3.7  Pages 29 - 36
Chapter 4  Transient Circuit Analysis  Sections 4.1 - 4.3  Pages 48 - 52

**Problems:**

Pages 5 - 15  Problems 1.4, 20, 21, 23, 24, 25, 27, 38, 44, 48
Pages 20 - 27  Problems 2.4, 5, 6, 9, 12, 15, 19, 20, 21, 22, 23, 24
Pages 40 - 46  Problems 3.7, 11, 28
Pages 52 - 59  Problems 4.1, 2, 3, 4, 5, 6, 11, 13, 14
Reading Assignment:


- Chapter 4  Semiconductors
  - Sections 4.1 - 4.5
  - Pages 411 - 501


- Chapter 4  Semiconductors
  - Sections 4.1 - 4.5
  - Pages 401 - 491


- Chapter 7  Diodes
  - Sections 7.1 - 7.10
  - Pages 98 - 111
- Chapter 8  Bipolar Junction Transistors
  - Sections 8.1 - 7.8
  - Pages 129 - 138
- Chapter 9  Field Effect Transistors
  - Sections 9.1 - 9.7
  - Pages 155 - 162
Operational Amplifiers (Op-Amps)

**Reading Assignment:** Principles of Oscillators, Waveform Generators, Op-Amps, and Active Filters


- Chapter 7 Operational Amplifiers Sections 7.1 - 7.17 Pages 537 - 563
- Chapter 8 Filters Sections 8.1 - 8.9 Pages 565 - 584
- Chapter 9 Oscillators and Timers Sections 9.1 - 9.6 Pages 585 - 600


- Chapter 8 Operational Amplifiers Sections 8.1 - 8.17 Pages 635 - 661
- Chapter 9 Filters Sections 9.1 - 9.9 Pages 663 - 682
- Chapter 10 Oscillators and Timers Sections 10.1 - 10.6 Pages 683 - 698


- Chapter 10 Operational Amplifiers Sections 10.1 - 10.9 Pages 174 - 179
Digital Electronics

Reading Assignment: Digital Electronics, Switching Circuits, Principles of Waveform Generators


Chapter 12 Digital Electronics Sections 12.1 - 12.12 Pages 631 - 777


Chapter 12 Digital Electronics Sections 12.1 - 12.12 Pages 717 - 858


Chapter 11 Switching Logic and Circuits Sections 11.1 - 11.5 Pages 192 - 197
Solved Problems: Pages 198 - 203 # 1, 2, 6, 12
Supplementary Problems: Pages 205 - 205 # 15, 16, 17, 18

Chapter 12 Digital Logic Applications Sections 12.1 - 12.3 Pages 208 - 212
Solved Problems: Pages 212 - 218 # 1 - 21
Supplementary Problems: Pages 219 - 221 # 22 - 39