

BME308 Biomedical Signals and Circuits Winter 2021

Lecture session: Monday, Wednesday, Friday, 2:00 - 2:50 PM
Lab session: Monday, Wednesday, 3:00-4:30 PM.
Room: TBD. The in-person sessions are on Mondays only.

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Lab Instructor: Nicholas D Marchuk
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TA: David Miller davidmiller2023.1@u.northwestern.edu
TA: Vatsala Goyal vatsalagoyal2022@u.northwestern.edu
Peer tutor: Joshua Lawton joshualawton2021@u.northwestern.edu
Peer tutor: Kate Chu katechu2021@u.northwestern.edu
Office hours: TBD, Zoom sessions only

Textbook: Customized *Basic Engineering Circuit Analysis*, by J. David Irwin & R. Mark Nelms, Wiley
<https://www.vitalsource.com/custom/9781119237297>
Electronics out of the Lab, Michael Peshkin, Northwestern University Mechanical Engineering.

Prerequisite: Physics, Calculus, Differential equations

Course objectives: This course focuses on hands-on skills of electrical circuit analysis, electronics, and signal processing designed for biomedical engineering students. This is the first course in the biomedical signal processing series (BME 306 and BME 307 will follow). At the end of this course, students will be able to (1) understand methods to analyze DC and AC circuits; (2) understand practical signal acquisition and analysis; (3) construct basic electrical circuits for biomedical applications; (4) design circuit system and use simulation software to evaluate them; (5) understand the concept of temporal-spectral analysis and Fourier Transform.

Course outline

Basic concepts of circuit analysis
Resistive circuits
Nodal analysis and loop analysis
Op-Amp
Capacitor, inductor, and transistor
AC circuits and power analysis
EKG principle and acquisition
Fourier transform
Filtering, bandwidth, sampling, and aliasing

Grading

Final Exam	15%
Midterm	15%
Homework	20%
Quiz	10%
Projects/Labs	40%
Total	100%

Key dates:

Midterm exam: 02/15/2021

Final exam: 03/16/2021

Note: Problem sets due one week after initial assignment (may be extended for a second week depending on the performance of most of the class or specified otherwise). There will be a penalty for missing classes without prior approval. Course projects will be discussed in lecture and lab sessions.

Quiz on each Monday.

The current schedule is subjected to minor revisions as the semester proceeds.

The homework and research projects involve Python Programming.

If unanticipated conflicts arise, the student should contact the instructor at least one week in advance to discuss arrangements for make-up examinations or turning in problem sets late.

Zero tolerance for academic plagiarism and dishonesty