

## **BME4011 – CAD/CAE of Bioelectrical Devices**

1 Credit

Instructor: Birin Yucesan, [yuces001@umn.edu](mailto:yuces001@umn.edu)

Time/Location: TBD

Office Hours: 1 hour after each lecture.

### **Prerequisites:**

BME4011/5

### **Course Goals and Objectives:**

In this course, students will learn on how to do simulation, analysis, and design of the industry common Bioelectrical Devices with using CAD software:

- **Altium Designer CAD:**  
Topics-- basic features of Altium Designer and introduce topics such as; Printed Circuit Board Assembly (PCA) design, multi-sheet design, Printed Circuit Board (PCB) design, creating classes and rooms, PCB guides, global editing, navigation through PCBA project, creating polygons, supplier link integration, footprint with both 2D and 3D and version control.
- **LT Spice:**  
Topics-- simulate switch mode power supplies, compute efficiencies and observe power supply start-up behavior and transient response and utilize LT Spice as a general purpose SPICE simulator for AC analysis, DC sweeps, noise analysis and circuit simulations.

### **Required Materials:**

There is no required textbook for this course. The following online references/sites are strongly suggested for the students. The referenced book is optional reference for course work and projects. There will be also reading/reference material which will be handout throughout the course.

- <http://techdocs.altium.com/>
- <http://altiumvideos.live.altium.com/>
- <https://groups.yahoo.com/neo/groups/LTspice/info>
- [http://ltwiki.org/index.php5?title=LTspice\\_Annotated\\_and\\_Expanded\\_Help\\*](http://ltwiki.org/index.php5?title=LTspice_Annotated_and_Expanded_Help*)
- *Design and Development of Medical Electronic Instrumentation: A Practical Perspective of the Design, Construction, and Test of Medical Device.* ISBN-10: 0471676233 | ISBN-13: 978-0471676232

### **Assignments, Projects and Final Exam:**

*Assignments:* There will be weekly homework assignments where students need to demonstrate their design knowledge via CAD software related to the lectures.

*Projects:* There will be an individual final project where each student will demonstrate their CAD design skills by completing a bioelectrical design; from design requirements to final assembly. The project will be based on the industry applications.

*Final Exams:* There won't be any final exam for this course.

**Attendance Requirements/Penalties:**

This is lab/hands on extensive course. Attendance is required for all lecture sessions. Any absence should be communicated to the instructor. Unexcused absences will cause reduction in student's overall course grade.

**Statement on Extra Credit:**

There won't be any extra credit for this course.

**Policy for makeup work:**

Students with excused absences may be able complete missing assignments with grade reduction.

**Grading Policy:**

Homework 70%

Final Project 30%

The grading will be scaled per:

93-100: A	90-92.9: A-	
87-89.9: B+	84-86.9: B	81-83.9: B-
78-80.9: C+	75-77.9: C	72-74.9: C-
66-71.9: D+	60-65.9: D	<60: F

*Depending on class performance, curve might be applied to overall grading.*

**Grade Definitions:**

Please see the University of Minnesota's Grading and Transcripts policy at <http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html>

**Student Conduct Code:**

Students in this course are expected to adhere to the University of Minnesota's Student Conduct Code: [http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)

**Administrative Policy for Legitimate Absences:**

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include illness of the student or his or her dependent, participation in intercollegiate athletic events. For other University of Minnesota policies regarding absences and makeup work, please see <http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>

**Board of Regents and Administrative Policy on Conduct, Teaching, and Learning:**

Please ensure that you are familiar with both the Student Conduct Code and Administrative Policy on Teaching and Learning:

<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>

[http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)

**Board of Regents Policy on Sexual Harassment:**

Please see this important information on the University of Minnesota's Policy on Sexual Harassment <http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

**Board of Regents Policy on Equity, Diversity, Equal Employment Opportunity, and Affirmative Action:**

Please see this important information on the University of Minnesota's Board of Regents Policy on Equity, Diversity, Equal Employment Opportunity, and Affirmative Action

[http://regents.umn.edu/sites/default/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf)

**Mental Health and Stress Management Services:**

Please know that as part of your experience here at the University of Minnesota, there are resources for you in time of stress. Please visit <http://mentalhealth.umn.edu/> for several resources for students, their parents, faculty, and staff.

**Board of Regents Policy on Academic Freedom:**

Please see this important information on the University of Minnesota's Board of Regents Policy on Academic Freedom and Responsibility

[http://regents.umn.edu/sites/default/files/policies/Academic\\_Freedom.pdf](http://regents.umn.edu/sites/default/files/policies/Academic_Freedom.pdf)