1. **Catalog Description** (3 credits): This course covers the applications as well as both quantitative and theoretical analyses of the bioelectrical signals associated with the brain, muscles, the heart, and devices used to modulate their activity. Bases of modeling, measuring, processing, and analyzing bioelectrical signals are discussed.

2. **Pre-requisites:** EEL 3008 and EEL 3112 (or approval of the instructor)

3. **Course Objectives:** The student will learn the physiological basis of bioelectrical signals; will be able to quantitatively describe and model physiologic systems; will be able to process and analyze measurements from living systems; and will be able to model bioelectrical signals generated by engineered systems.

4. **ABET (Professional):** Contribution of course to meeting the professional component (ABET only – undergraduate courses) – 4 hours of engineering science

5. **ABET (Outcomes):** Relationship of course to program outcomes: Skills student will develop in this course (ABET only undergraduate courses) – a, e, h, k

6. **Instructor:** Dr. Jack Judy  
   a. Office location: 210 NRF  
   b. Telephone: 846-1275  
   c. E-mail address: jack.judy@ufl.edu  
   d. Class Web site: TBA  
   e. Office hours: Tuesday at 11:30 am (right after lecture)

7. **Teaching Assistant:** Islam Badreldin  
   a. Office location: NEB 213B (location of the laboratory portion of the class)  
   b. Telephone: 517-618-9565  
   c. E-mail address: ibadreldin@ufl.edu  
   d. Office hours: TBD

8. **Meeting Times & Location:** Larsen 330, Tuesday 10:40-11:30 am, Thursday 10:40-12-30

9. **Class/Laboratory Schedule:** 3 class periods each week consisting of 50 minutes each and 1 laboratory period every two weeks consisting of 150 minutes.

10. **Material and Supply Fees:** $40.00

11. **Textbooks and Software Required:** Free e-book access at UF Library  
   a. Title: Bioelectricity: A Quantitative Approach  
      Authors: Robert Plonsey and Roger C. Barr  
      Publication date and edition: 2007 (3rd Edition)  
      ISBN number: 978-0-387-48865-3 (On-Line)  
   b. Software: Matlab with Simulink Student Edition
12. **Recommended Reading:** Supplemental material to be assigned and provided via course website

13. **Course Outline** (provide topics covered by week or by class period):
   - Week 1: Introduction to Bioelectricity and its Applications, Sources and Fields
   - Week 2: Sources and Fields (HW 1 Due)
   - Week 3: Bioelectric Potentials, Signals and Noise (HW 2 Due)
   - Week 4: Ion Pumps, Ion Channels, H-H Model, Action Potentials (HW 3 due)
   - Week 5: H-H Model, Action Potentials, Impulse Propogation (HW 4 due)
   - Week 6: Electrode Design and Fabrication (Midterm Exam 1)
   - Week 7: Transmembrane and Field Stimulation (HW 5 due)
   - Week 8: Extracellular Fields (HW 6 due)
   - Week 9: Cardiac Electrophysiology and ECG (HW 7 due)
   - Week 10: The Neuromuscular Junction (HW 8 due)
   - Week 11: Skeletal Muscle (Midterm Exam 2)
   - Week 12: Functional Electrical Stimulation (HW 9 due)
   - Week 13: Implantable Bioelectrical Systems (HW 10 due)
   - Week 14: Project Presentations
   - Week 15: Review
   - Final Exam

**Laboratory Topics**
- Joint flex sensing
- ECG Amplifier
- Neuroamplifier circuit
- Neuroamplifier
- Pacemaker Circuit
- Photoplethysmography

14. **Attendance and Expectations:** Attendance is required for all lectures unless otherwise noted by a course website announcement. Attendance is part of the final grade. Cell phones and other electronic devices are to be silenced. No text messaging during class or exams.

Students are permitted to work together on homework but the work submitted must be individual work.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: [https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx)

15. **Grading:**
- Exam 1 - 15%
- Exam 2 - 15%
- Final exam - 25%
- Homework - 20%
- Lab - 25%
16. Grading Scale:

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<tr>
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“A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better).” Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

17. Homework and Make-Up Exam Policy: Late homework will receive a 20% deducted per day unless prior arrangements were made with the instructor.

If you have a University-approved excuse and arrange for it in advance, or in case of documented emergency, a make-up exam will be allowed and arrangements can be made for making up missed work. University attendance policies can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Otherwise, make-up exams will be considered only in extraordinary cases, and must be taken before the scheduled exam. The student must submit a written petition to the instructor two weeks prior to the scheduled exam and the instructor must approve the petition.

18. Honesty Policy: UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (http://www.dso.ufl.edu/scrr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

19. Accommodation for Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide documentation to the student who must then provide this documentation to the course instructor when requesting accommodation.

20. UF Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- UF Counseling & Wellness Center, psychological and psychiatric services, 3190 Radio Rd, 392-1575, online: http://www.counseling.ufl.edu/cwc/Default.aspx,
- Career Resource Center, Reitz Union, career and job search services, 392-1601.
- University Police Department, 392-1111 or 911 for emergencies
21. **Software Use**: All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

22. **Course Evaluation**: Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at: [https://evaluations.ufl.edu](https://evaluations.ufl.edu). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at: [https://evaluations.ufl.edu/results](https://evaluations.ufl.edu/results).