BME 1008 – Introduction to Biomedical Engineering
Updated: 8/20/2013

1. **Catalog Description**
   (1 credit hours)
   This class is an introduction to and overview of Biomedical Engineering. Lectures will be given by faculty experts in different areas of Biomedical Engineering. The goal is to provide beginning students with an appreciation for the breadth of the field and guide them in making curriculum, major and career choices. https://login.ufl.edu/idp/Authn/UserPassword.

2. **Pre-requisites and Co-requisites**
   None

3. **Course Objectives**
   a. Provide students with a broad overview of the biomedical engineering field
   b. Guide students in making early curriculum, major, and education choices concerning biomedical engineering
   c. Provide an overview of common careers available to BME graduates
   d. Provide students with knowledge of contemporary issues in BME.

4. **Contribution of course to meeting the professional component**
   - The student will learn about professional and ethical responsibility
   - The student will learn to communicate effectively
   - The student will learn about contemporary BME research
   - The student will learn to use the techniques, skills and modern biomedical engineering tools necessary for biomedical engineering practice

5. **Relationship of course to program outcomes**

   - The students will be able to make more informed academic and career choices.

6. **Instructors:**
   Dr. Brandi K. Ormerod
   Office: J296, Biomedical Sciences Bldg
   Phone: 273-8125
   Email: bormerod@bme.ufl.edu
   Website: http://stemcell.ufl.edu
   Office Hours: Wednesdays 5:00pm-6:00pm *or by email appt.

7. **Teaching Assistants**
   Olga Gopan
   Office: Room 113 - Medical Physics Building
   Email Address: ogopan@ufl.edu
   Office hours: Thursday 1:00pm-2:00pm.

8. Meeting Times

Course meets once per week
One 50 minute lecture period Wednesdays period 9 (4:05-4:55pm)

9. Class schedule

Class meets for 1 - 50 min lecture per week (Wednesdays period 9)

10. Meeting Location

NEB202

11. Material and Supply Fees – None

12. Textbooks and Software Required – None

13. Recommended Reading

The following websites provide a nice overview of the BME field and current events:

i. bme.ufl.edu (Information on our faculty, research, and laboratories)
ii. undergraduate.bme.ufl.edu (Information on the undergraduate UF BME curriculum)
iii. http://www.bmes.org (Check out the undergraduate research section for career connections, news and press, and other resources)
iv. www.whitaker.org (Check out undergraduate research programs and summer programs)
v. www.nibib.nih.gov (Information on recent advances in Biomedical Engineering and government funding in BME).
vi. www.embs.org (Information on the IEEE Engineering in Medicine and Biology Society)

14. **Course Outline – **LECTURE SCHEDULE SUBJECT TO CHANGE**

8/21/13: Introduction to the Course and Overview of the Biomedical Engineering Field
(Dr. Brandi Ormerod)

8/28/13: Introduction to Brain Computer Interfaces
(Dr. Aysegul Gunduz)

9/4/13: BME, Regenerative Medicine, and the Role of Engineering in Health Care

(UF BME Chair – Dr. Christine Schmidt)

5-8 QUESTION QUIZ

9/11/13: Self-assembled biomaterials to modulate immune responses
(Dr. Greg Hudalla)

9/18/13: Experiences at Kimberly-Clark and Introduction to BME Design
(Dr. James Schumacher)

9/25/13: Molecular Imaging and the Field of Medical Physics
(Dr. Dave Gilland)

5-8 QUESTION QUIZ

10/2/13: The hip bone is connected to the knee bone… most of the time
(Dr. Scott Banks)

PAPER #1 DUE

10/9/13: NanoBioMagnetics
(Dr. Jon Dobson)

10/16/13: Biomedical Engineering and Big Data!
(Dr. Parisa Rashidi)

5-8 QUESTION QUIZ

10/23/13: Image Guidance Tools
(Dr. Frank Bova)

10/30/13: Simulating Human Physiology and Overview of the BME Curriculum
(Dr. Hans van Oostrom)

11/6/13: Regenerating the Liver
(Dr. Bryon Petersen)

5-8 QUESTION QUIZ

11/13/13: Modeling Orthopaedic Injuries
(Dr. Kyle Allen)

11/20/13: A BME approach to epilepsy
(Dr. Paul Carney)

PAPER #2 DUE

11/27/13: No Class - THANKSGIVING

12/4/13: **FINAL QUIZ**

15. Attendance and Expectations

Attendance is required and will make up a substantial part of your final grade. Every lecture will have a sign-in sheet that you must sign with your initials. Don't forget to sign the sheet because you will not receive credit without signing the sheet. If you are disruptive to the class, fall asleep, use your computer or phone or do crossword puzzles during class, I will deduct your attendance credits.

Common Errors:

- Signing in for your friends. Your handwriting will be checked.
- Missing class without a doctor's certificate or the copy of a death certificate for your unfortunate loved one. I'm fully aware of how dangerous exam week is for grandparents and slept about 3h a night in my third year because of an extremely heavy courseload.
- From the registrar's office - Final exams are determined by course meeting times, except for certain large courses. No student is required to take more than three final exams in one day. If two exams are scheduled at the same time, assembly exams take priority over time-of-class exams. When two assembly exams or two time-of-class exams conflict, the course with the

higher number will take priority. Instructors giving make-up exams will make the necessary adjustments.

16. Grading

Quizzes: 10% per quiz (40% total)
Final Quiz: 20%
Attendance: 20%
Term Papers: 20% [10% each]

17. Grading Scale

18. A	A-	B+	B	B-	C+
92.5-100	90.0-92.4	87.5-89.9	82.5-87.5	80.0-82.4	77.5-79.9
C	C-	D+	D	D-	F
72.5-77.5	70.0-72.4	67.5-69.9	62.5-67.5	60.0-62.4	0-59.9

* I will round your grade to the nearest tenth of a point; then, your letter grade will be assigned based on the above table.

* Students asking Dr. Ormerod to regrade a quiz or paper should realize that Dr. Ormerod can also reduce the grade on said document.

"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

19. Make-up Exam Policy

Quizzes can be made up in extreme circumstances if a Doctor's note is presented or death certificate (regarding someone in the immediate family) is presented before the start of the exam.

20. Honesty Policy

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

21. Accommodation for Students with Disabilities

Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

22. UF Counseling Services

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

23. 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.

24. Assignment Examples:

Paper #1
Due: 10/2/13 11:55 PM (5 minutes before midnight)
How: Use Turn-it-in via Sakai Website

Assignment: Pick 1 of the following options and write a 1 page essay on the topic

Option #1 – BME Application Essay: The BME online application consists of basic information submitted online and a one page essay. The essay should contain the reasons you want to study BME, which BME subjects interest you, what do you want to do with your BME BS degree, and which BME Program Track are you interested in and why.

Option #2 - Imagine you've pursued a career in biomedical engineering. You are now 5 years into your career (post-graduation). Describe the challenges in human health that you have worked on during your 5 year career. Describe the engineering and biology techniques you are using or have used to solve these challenges.

Logistics: The essay should be one 8.5 in x 11in page with 1 inch margins, 11 point Times New Roman font, with no graphics. Line spacing is at the student's digression, but the suggestions spacing is 1.5.

Paper #2
Due: 11/20/13, 11:55 PM (5 minutes before midnight)

Assignment: Pick 1 lecture from the class. Describe the medical, biological, and engineering components of the research presented in that lecture.

Logistics: 1 Page, 1 inch margins, 12 point font
Suggested format:

- 3 paragraphs
  - Paragraph 1: The work presented by Dr. X addressed this medical issue
  - Paragraph 2: The work presented by Dr. X used these biological techniques
  - Paragraph 3: The work presented by Dr. X used these engineering techniques

Short Example:

In the lecture presented by Dr. Ormerod, she described her work on using neural progenitor cells to repair different kinds of central nervous system (brain and spinal cord) injuries or diseases. Neural progenitor cells can be used to halt cell death when engineered to secrete growth factors prior to transplantation or to restore function if they are engineered to deliver neurotransmitter or programmed to grow into neurons that can restore neural circuits.

Dr. Ormerod uses animal models to understand how endogenous neural progenitor cells make new neurons in the hippocampus and olfactory bulbs throughout life. With a model, she can examine how learning and memory is compromised, whether deficient neurogenesis may contribute to the problems and how restoring neurogenesis can fix the problem. She can hypothesize about how neuron addition to other brain regions may be able to restore neural function. Her lab uses immunohistochemistry to identify new cells and their phenotypes, multiplex array technology to ask how neuroinflammation impacts cognition and neurogenesis and behavioral tasks that permit the experimenter to evaluate a cognitive process in rats who cannot simply tell you what they know and remember. Using these techniques, she is developing new diagnostics and therapeutics for CNS disease and injury.

Dr. Ormerod uses multiplex quantification and complex statistical designs to relate the concentrations of circulating and brain analytes to cognitive measures. Her work ultimately seeks to identify and develop novel anti-inflammatory strategies to treat cognitive issues, fabricate bioassays that can predict cognitive decline in middle-aged individuals and to engineer stem cells to secrete factors that will halt cell death or restore function or integrate to existing neuronal circuitry concentrations.

Logistics: The essay should be one 8.5 in x 11in page with 1 inch margins, 11 point Times New Roman font, with no graphics. Line spacing is at the student's digression, but the suggestions spacing is 1.5.