

# Introduction to Biomedical Engineering

BMES 5034 (VT), 603 (WFU), Fall 2005

Tuesday and Thursday 2:00 – 3:15

Location: WFU: Teleconference Center

VT: Hancock 220

Instructors: Dr. Joel Berry ([jberry@wfubmc.edu](mailto:jberry@wfubmc.edu))

336 716 5057

Office: MRI Bldg 1<sup>st</sup> floor, WFU

Office hours: by appt.

Dr. Joel Stitzel ([jstitzel@wfubmc.edu](mailto:jstitzel@wfubmc.edu))

336 716 5597

Office: MRI Bldg 2<sup>nd</sup> floor, WFU

Office hours: by appt.

Dr. Clay Gabler ([gabler@vt.edu](mailto:gabler@vt.edu))

540-231-7190

Office: 100F Randolph Hall, Virginia Tech

Office hours: by appt.

VT GTA – Steven Ryan ([stryan2@vt.edu](mailto:stryan2@vt.edu))

Prerequisites:

N/A

Recommended Textbook (not required):

Enderle, Blanchard, and Bronzino, “Introduction to Biomedical Engineering”,  
Second Edition (2005)

## **INTRODUCTION & MISSION**

The mission of Introduction to Biomedical Engineering is to introduce students to the various research areas that fall under the umbrella of biomedical engineering, emphasizing the multidisciplinary nature of biomedical engineering and the need for collaboration. Throughout the course, students will be guided to think about the engineering and biomedical issues involved in the problems presented. By the same token, they will begin to learn how to effectively communicate engineering concepts to clinicians and basic scientists. The NIH and industry have recognized that multidisciplinary teams will be required to solve most of the biomedical problems of the future.

## **COURSE CONTENT**

For many topics, there is no single book that provides an introduction to the field of biomedical engineering. For this reason, individual handouts may be prepared for each topic as needed. **(get a 2 or 3 inch D ring binder)**

Session #	Class Date		Instructor	Topic
1	Thurs	Aug 25	Berry	Biomedical Engineering Defined
2	Tues	Aug 30	Berry	Global View of Health Care – Lecture I
3	Thurs	Sept 1	Stitzel	Global View of Health Care – Lecture II
4	Tues	Sept 6	Stitzel	FDA Regulations
5	Thurs	Sept 8	Gabler	Overview of Biomechanics
6	Tues	Sept 13	Berry	Exam 1
7	Thurs	Sept 15	Gabler	Mathematical Modeling in Biomechanics
8	Tues	Sept 20	Gabler	Energy Considerations in Biomechanics
9	Thurs	Sept 22	Gabler	Multi-body Mass-Spring-Damper Systems
10	Tues	Sept 27	Gabler	Impact Injury Biomechanics - I
11	Thurs	Sept 29	Gabler	Impact Injury Biomechanics - II
12	Tues	Oct 4	Gabler	Exam 2
13	Thurs	Oct 6	Stitzel	Overview of Cell Biology
14	Tues	Oct 11	Stitzel	Cell Culture
15	Thurs	Oct 13	Stitzel	Cell Adhesion and Migration
16	Tues	Oct 18	Stitzel	Biomaterials
17	Thurs	Oct 20	Stitzel	Drug and Gene Delivery
18	Tues	Oct 25	Stitzel	Tissue Culture Bioreactors
19	Thurs	Oct 27	Stitzel	Exam 3
20	Tues	Nov 1	Berry	Biomedical Imaging – X-ray
21	Thurs	Nov 3	Berry	Tomography, reconstruction
22	Tues	Nov 8	Berry	Computed Tomography
23	Thurs	Nov 10	Berry	MRI
24	Tues	Nov 15	Berry	Ultrasound
25	Thurs	Nov 17	Berry	Radiation Therapy
26	Tues	Nov 22	Berry	
		Nov 24		Thanksgiving Holiday
27	Tues	Nov 29	Berry	
28	Thurs	Dec 1	Stitzel	Ethical and Moral issues in BME
29	Tues	Dec 6	Berry/ Stitzel	Exam 4 (not cumulative)

## COURSE ORGANIZATION and GRADING SYSTEM

Homework assignments and quizzes will be given periodically throughout the semester. The final grade will be determined by a combination of the course requirements:

Homework and Quizzes	15%
Includes pre and post	
Exam 1	15%
Exam 2	15%
Exam 3	15%
Exam 4	15%
<u>Module Projects</u>	<u>25% (includes presentation)</u>
Total	100%

\*Class Folder: We highly recommend that you keep a class folder for this course. Keep all lecture materials, notetaking materials, papers, etc in it. It will make your life easier.

Grades will be based most likely on the following scale; however, the instructors reserve the right to curve the grades up or down based on the overall class performance:

92 +	A
90 – 92	A-
88 – 90	B+
82 – 88	B
80 – 82	B-
78 – 80	C+
72 – 78	C
70 – 72	C-
68 – 70	D+
62 – 68	D
60 – 62	D-
0 – 60	F

Attendance at all classes is mandatory and no late assignments will be accepted.

Extra credit will be given in two manners:

- 1) News stories on recent biomedical engineering advances
  - a. **type** a ½ - 1 page summary, turn it in
  - b. present to class in about 5 minutes