

**BIOE 484**  
**Engineering in Biology**  
**3 credit hours**

Biology with an emphasis on utilization, design, and modeling. Should be taken by all who are interested in learning about products or processes involving living things.

**Scheduling:** T-Th 9:30-10:45 EGR 0135

**Instructor:** Arthur T. Johnson. PhD PE  
Professor Emeritus  
1429 ANSC  
301-405-1184  
artjohns@umd.edu

**Text:** Johnson, A. T., 2010, Biology for Engineers, Taylor and Francis, Boca Raton, FL ISBN 978-1-4200-7763-6

Addenda are available on the web at  
<http://bioe.umd.edu/~artjohns/books/bioforengineers.html>

**Prerequisites:** Permission of the department

**Objectives of the Course:**

1. Present biology in a manner useful to engineers and others who wish to design products or processes involving living things.
2. Illustrate how mathematical models of life processes can be created.
3. Give students an appreciation for bioengineering approaches to biology.
4. Introduce engineering students to methods used by biological scientists.

**Approach:**

This course will consist of lectures/discussion covering biology from a utilization perspective, and lectures on illustrative mathematical models that capture the essences of characteristics of living beings. The biology material will focus on:

- distinguishing engineering from biological science
- principles from the sciences applicable to biology
- typical biological responses to physical, chemical, and biological environmental elements
- scaling of biological responses
- different means to utilize living things

**Modeling techniques to be illustrated are:**

- theoretical models
- empirical models
- compartmental models
- random component models
- physiological and ecological models

In addition, time will be devoted to methods created by biologists to deal with measurement and manipulation of living things.

**Grading:**

Course grades will be obtained from:

Homework	20%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Final Exam	20%

Students will be formed into small groups. Homework assignments will be submitted by groups. Groups will be reassigned after the first two semester exams. Students will have the opportunity at the end of the group period to rate the efforts of group members. The instructor reserves the right to adjust the final grade by up to one letter grade depending on group participation.

There will be three semester exams and a final exam. They will each be multiple choice, and structured to distinguish among student abilities. Not all students will earn an “A” grade in the course. Top grades will be earned by the best students.

There are unavoidable times when students are not well enough to take an exam when it is scheduled. In order to make up an exam, a bona fide note from a physician is required. In the event that the exam cannot be rescheduled before the end of the semester, an incomplete grade will be issued and the student will be required to take the exam during the next semester that the course is offered.

Cell phones are not welcome in class. If you have one, please make sure it does not ring during class time. If it does, you will be asked to leave.

Class attendance is for your benefit, and is encouraged. Students are also encouraged to ask questions or raise interesting points in class.

Course information can be found at <http://umd.blackboard.com>. You will need an email address at the University of Maryland to access this information

Spring 2011

If you have a documented disability and wish to discuss academic accommodations please contact Dr. Johnson (301-405-1184) as soon as possible.

Unauthorized copying, cheating, or plagiarism will not be tolerated. The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.studenthonorcouncil.umd.edu/whatis.html>.

**Class Schedule**

<b>Class</b>	<b>Date</b>	<b>Topic</b>	<b>Text</b>
1	Jan 25	Introduction	
2	27	Biological Science vs Bioengineering	Chapter 1
3	Feb 1	Modeling	
4	3	Principles of Physics I	2. – 2.6
5	8	Principles of Physics II	2.7 – 2.12
6	10	Principles of Chemistry I	3. – 3.5
7	15	Principles of Chemistry II	3.6 – 3.12
8	17	Principles of Mathematics	4. – 4.3
9	22	<b>AIMBE</b>	
10	24	Principles of Engineering Science	4.4 – 4.7
11	Mar 1	Principles of Biology I	5. – 5.2
12	3	Principles of Biology II	5.3 – 5.4
13	8	Principles of Biology III	5.5 – 5.6
14	10	<b>EXAM I</b>	
15	15	BRIC I	6. – 6.4
16	17	BRIC II	6.5 – 6.9
		<b>Spring Break (3/21-3/25)</b>	
17	29	BRIC III	6.10 – 6.11
18	31	BRIC IV	6.12 – 6.13
19	Apr 5	BRIC V	6.14 – 6.15
20	7	BRIC VI	6.16 – 6.18
21	12	BRIC VII	6.19 – 6.20
22	14	BRIC VIII	6.21 – 6.23
23	19	<b>EXAM II</b>	
24	21	Scaling Factors I	7. – 7.4
25	26	Scaling Factors II	7.5 – 7.6
26	24	Utilizing Living Systems I	8. – 8.2
27	May 3	Utilizing Living Systems II	8.3 – 8.4
28	5	<b>EXAM III</b>	
29	10	Other Opportunities	
	13	<b>FINAL EXAM 8 – 10 am</b>	