BENG 313: Physiology for Engineers
Fall 2017

Instructor:
Dr. Michelle Harris-Love
- E-mail: mharri36@gmu.edu
- Phone: 703-993-3590
- Office: Nguyen Engineering Building, Room 2611
- Office hours: By appointment

Grader:
Zach Baker (zbaker@gmu.edu)

Lectures:
- Monday and Wednesday: 9:00am-10:15am, Nguyen Engineering Building, Room 1108

Important Notes and Dates:
- Final Exam: Monday, December 18: 7:30 – 10:30 am
- Holidays: September 4th (Labor Day); October 9th (Columbus Day), class held on October 10th; November 22nd-26th (Thanksgiving Break)

Required Textbook:
- Medical Physiology, second edition or third edition (Boron and Boulpaep)

Other sources (optional):
- The Neurology of Eye Movements (Leigh and Zee)
- Quantitative Physiology for Engineers (Feher)
- Human Physiology (Silverthorn)
- Principles of Neural Science (Kandel, Schwartz and Jessell)
- Human Physiology (Widmaier, Raff and Strang)
- Foundations of Cellular Neurophysiology (Johnston and Wu)
- Hole's Human Anatomy (Sheir, Butler, and Lewis)

Course Description:
This course provides a broad introduction to the subject of human physiology, focusing on learning the subject matter from an engineering viewpoint, with an emphasis on organs and physiological systems where engineering has a significant role.

Prerequisites:
- BENG 101 and BIOL 213 (C or better)
- MATH 114 or 116 (B- or better)
Requirement or Elective:
• This course is a required course for all bioengineering students.

Course Objectives:
After successful completion of this course the student will be able to (1) define homeostasis and physiological feedback, (2) describe the mechanics of ventilation and sodium reabsorption, (3) explain the physical basis of blood flow and regulation of overall circulatory function, (4) apply the Nernst Equation and electrical circuits to describe ion flow through cell membranes and (5) summarize the organization of sensory systems and the process of muscle contraction.

Assignments, Examinations and Grading:

Homework Assignments:
• There will be a total of five homework assignments.
• Homework assignments will be posted (on Blackboard via myMason) and will be due 1 week later at the beginning of the class. Homework sent by e-mail will not be accepted.
• Late homework will be accepted with a 10% reduction in grade for each day they are late by. However, once a homework assignment is discussed in class or the solution is posted, submissions will no longer be accepted.
• All formal homework assignments are to be treated as individual and not collective efforts, unless specified otherwise. A severe penalty will be given to any assignment which indicates collusion or cheating. The usual penalty for cheating is failure in the course.

Exams:
• There will be a total of three exams (two midterms and one final)
• Exams will be closed book and notes, and will contain questions concerning assigned reading, lecture material, homework problems, and class discussions.
• No makeup exam will be given without a valid excuse deemed justified by the instructor.

Extra Credits:
Each exam will have a quantitatively challenging extra credit problem worth 5 points (2 problems for a total of 10 points on the final exam).

Attendance and Class Participation:

<table>
<thead>
<tr>
<th>100 points</th>
<th>80 points</th>
<th>60 points</th>
<th>40 points</th>
<th>20 points</th>
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</thead>
<tbody>
<tr>
<td>Never misses classes</td>
<td>Rarely misses classes</td>
<td>Sometimes misses classes</td>
<td>Absent for most classes</td>
<td>Rarely attends classes</td>
</tr>
<tr>
<td>Never misses meetings</td>
<td>Rarely misses meetings</td>
<td>Sometimes misses meetings</td>
<td>Absent for most meetings</td>
<td>Rarely attends meetings</td>
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<tr>
<td>Actively contributes to the discussion</td>
<td>Semi-actively contributes to the discussion</td>
<td>Sometimes contributes to the discussion</td>
<td>Rarely contributes to the discussion</td>
<td>Never contributes to the discussion</td>
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Grading Structure:

- The final grade will be based on (Tentative, subject to change):

<table>
<thead>
<tr>
<th>Course</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>BENG 313</td>
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<tr>
<td>Attendance/Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>20%</td>
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<tr>
<td>Exam I</td>
<td>20%</td>
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<tr>
<td>Exam II</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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- Letter grades will be based on a 10 point scale ([90, 100] = A, [80, 90) = B, ...)

Important Notes:

- The grading scale for this course is:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>97-100%</td>
<td>A +</td>
</tr>
<tr>
<td>93-97%</td>
<td>A</td>
</tr>
<tr>
<td>90-93%</td>
<td>A -</td>
</tr>
<tr>
<td>87-90%</td>
<td>B +</td>
</tr>
<tr>
<td>83-87%</td>
<td>B</td>
</tr>
<tr>
<td>80-83%</td>
<td>B -</td>
</tr>
<tr>
<td>77-80%</td>
<td>C +</td>
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<tr>
<td>73-77%</td>
<td>C</td>
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<tr>
<td>70-73%</td>
<td>C - *</td>
</tr>
<tr>
<td>60-70%</td>
<td>D *</td>
</tr>
<tr>
<td>0-60%</td>
<td>Failing *</td>
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</table>

* Grades of "C-" and "D" in this course are considered unsatisfactory. According to departmental policy, no C- or D in ECE, BENG, BIOL, CS or ENGR courses can be submitted for the degree in Bioengineering. You will need to repeat the course if you obtain a grade of C- or lower.

GMU Policies and Resources for Students:

- Students must adhere to the guidelines of the George Mason University Honor Code [See http://academicintegrity.gmu.edu/honorcode/].
- Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/all-policies/].
- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
• The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students’ personal experience and academic performance [See http://caps.gmu.edu/].

• Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu/].

• Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

• The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See http://writingcenter.gmu.edu/].

Professional Dispositions:
• Students are expected to exhibit professional behaviors and dispositions at all times.

Core Values Commitment:
• Along with the College of Education & Human Development, Volgenau School of Engineering is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles. [See http://cehd.gmu.edu/values/].

WAVES: Wellness, Alcohol and Violence Education and Services:
WAVES promotes wellness within the Mason community through health education, alcohol/drug assessment and education, and violence awareness, prevention and sexual assault response. We help students make healthy, safe choices and encourage lifelong, thoughtful healthy decision-making through individualized support, creative programming, and evidence-based education and outreach.

WAVES office 703-993-9999
SUB I, Suite 3200
24-Hour Sexual and Intimate Partner Violence Crisis Line 703-380-1434
waves.gmu.edu

- 703-360-7273 (Fairfax County Office for Women and Domestic and Sexual Violence Services 25 hotline)
- 703- 228-4848 (Arlington County Domestic Violence Services Hotline)
- 703-368-4141 (Prince William County Sexual Assault Victims Advocacy Services (SAVAS) hotline)
- 1-800-838-8238 (Virginia Family Violence and Sexual Assault Hotline)
- 1-800-656-HOPE (Rape, Abuse and Incest National Network)
https://ohl.rainn.org/online/
CAPS: Counseling and Psychological Services:

Counseling and Psychological Services (CAPS) provides a wide range of free confidential services to students, faculty, and staff. Services are provided by a staff of professional clinical psychologists, social workers, counselors, learning specialists, and psychiatric providers. CAPS individual and group counseling, workshops, and outreach programs are designed to enhance students’ personal experience and academic performance.

Visit us at caps.gmu.edu for additional resources.
  - For consultation or emergency assistance during office hours call 703-993-2380.
  - For assistance during non-office hours, call University Police at 703-993-4357.
  - 703-527-4077 (CrisisLink)
  - 1-800-273-8255 (National Suicide Prevention Lifeline)
  - 1-877-838-2838 (Veterans’ Crisis Hotline)

Student Health Services (SHS) — Provides confidential health care to enrolled students in emergency and non-emergency circumstances on the Fairfax, Arlington and Prince William campuses. If there is a medical emergency and Student Health Services (SHS) is closed, please contact the free after-hours nurse ((703) 993-2831), a hospital emergency room, an urgent care facility, or call 911.

SUB 1, Suite 2300
703-993-2831

University Police:
Emergency: 911    Non-Emergency: (703) 993-2810
Reporting a Crime (Crime Solvers Anonymous Tip Hot-Line): (703) 993-4111
Mason Police Website: http://police.gmu.edu/
Eric Heath, Chief of Police    Phone: (703) 993-3840    E-mail: eheath2@gmu.edu