Northwestern University
BME 403  Advanced Systems Physiology Spring 2005
Professor Robert A. Linsenmeier

MWF 3-4 PM: 303/403 Lecture
F 1:00-2:30 PM: special 403 Discussion
T 2 - 3:30 or 4 - 5:30:  303/403 Discussion

For BME 403, students attend BME 303 classes and take those midterms, and also have a special discussion section. The 403 final is different. The special 403 material is described first, followed by the 303 syllabus.

BME 403 has several objectives: 1) Students should become familiar with some of the techniques used in physiology, using cells, animals and humans. 2) Students should be aware of a few of the interesting research questions that are related to the 303 body of material and the dynamic nature of the field. 3) Students should gain experience reading original literature in biology.  4) Students should gain experience in presenting material in a clear way to the class.

Presentations: Papers and discussion topics for the special 403 Discussion change somewhat each year based on student interest. Each student will be responsible for presenting the paper(s) for one week. Papers will be xeroxed and handed out. Students should use an overhead projector (or powerpoint and a video projector) to present their paper. In general a presentation should consist of the following: 1) What is the question addressed in the paper? What was known about this previously? 2) What methods were used to address this question? 3) Discuss the results and explain how they relate to the original question.  4) Give your judgment of this paper (importance of work, flaws in the experimental design or in the data; do data support conclusions? What would you have done differently? What would you do to follow up the work presented). I am available to talk about the papers in advance of your presentation.

Assignments: In addition to presentation of the paper(s) for one week, each student is required to read all the papers and is expected to contribute to the discussion. If we have self-regulation on this, there will be no specific requirement for contributions to the discussion.

Grades
These students will be expected to attend 303 lectures and the grade will be based on the 303 midterms (20% each), the presentation and specific work in 403 (25%), 303 homework (10%) and a 303/403 final exam (25%). The 403 final will contain material only from the last part of 303, and from the 403 readings. A cumulative percentage of 80% is needed for an A.

Alternative Plan
For students who have had substantial parts of the 303 material, and do not wish to do that lecture, an alternative is available. Students may take a pretest to determine their level of competence in 303 material. If they do well, they may opt to do a different set of work in place of the 303 midterms and homework. Contact Professor Linsenmeier about this alternative before or during the first week of class.

4/1 Organization; Discussion of BME 303 lab experiment

4/8 Water channels


Controversy about Yool paper. PDF posted on 403 blackboard site


4/15  
**PET measurements of metabolism**


4/22  
**Artificial pancreas**


4/29  
**Artificial Liver**


5/6  
**Tracer measurements**


5/13  

**Weight regulation**  


5/20  **Neuroendocrine topic.** Papers TBD

5/27  **Transdermal drug delivery.** Papers TBD

6/3  **Artificial kidney.** Papers TBD

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**Biomedical Engineering 303/403**  
**Systems Physiology**  
**Spring Quarter 2005**  
**Dr. Robert Linsenmeier**

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<th>Date</th>
<th>Topic</th>
<th>Reading</th>
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<td>T 3/29</td>
<td>1 Introduction; Membrane transport</td>
<td>134-147 (background: 124-133)</td>
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<tr>
<td>W 3/30</td>
<td>2 Membrane transport;</td>
<td>63-77; 150-156</td>
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<td>F 4/1</td>
<td>3 Epithelia</td>
<td>147-149</td>
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<td>M 4/4</td>
<td>4 Autonomic system; smooth muscle <strong>HWK1 DUE</strong></td>
<td>369-381; 413-420</td>
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<tr>
<td>T 4/5</td>
<td>Problem session</td>
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<td>W 4/6</td>
<td>5 Energy metabolism</td>
<td>99-111; 696-705;</td>
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<td>F 4/8</td>
<td>6 Energy metabolism</td>
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<td>M 4/11</td>
<td>7 Energy metabolism: endocrine regulation <strong>HWK2 DUE</strong></td>
<td>187-200; 705-715; 172-187*;</td>
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<td>T 4/12</td>
<td><strong>Prelab session - required</strong></td>
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<td>W 4/13</td>
<td>8 Energy metabolism: endocrine regulation</td>
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<td>F 4/15</td>
<td>9 Energy metabolism: endocrine regulation</td>
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Lab F, Su this week; T next week. See separate schedule below

| M 4/18| 10 Energy metabolism: endocrine regulation      |                                |
| T 4/19| Problem session                                 |                                |
| W 4/20| 11 Temperature regulation                       | 715-720                        |
| F 4/22| 12 Temperature regulation **LAB REPORT DUE**    |                                |

| M 4/25| Problem session                                 |                                |
| T 4/26| **1st Midterm Exam; Lectures 1-10**             | Chapter 21                     |
| W 4/27| 13 GI system                                    |                                |
| F 4/29| 14 GI system                                    |                                |

| M 5/2 | 15 Kidney: tubular transport **HWK 3 DUE**      | Chapter 19                     |
| T 5/3 | Problem session                                 |                                |
| W 5/4 | 16 Kidney: tubular transport                     |                                |
| F 5/6 | 17 Fluid and electrolyte balance                | 625-645                        |

| M 5/9 | 18 Fluid and electrolyte balance **HWK 4 Due**  |                                |
Course Communications:
We will be using the Blackboard system for communications. The site for BME 303 and 403 is http://courses.northwestern.edu/webapps/portal/frameset.jsp?tab=courses&url=/bin/common/course.pl?course_id=_105518_
You should all have access to this. If you ask content questions about this course by email, the answers may be posted here on the discussion board if they appear to be of general interest. Blackboard will also have files containing the homework assignments, practice exams, special instructions, possibly extra materials and links, and other features of the course.

Instructors:
Robert A. Linsenmeier, Professor, Tech E368, 491-3043, r-linsenmeier@northwestern.edu
Office Hours: 12:30-2 M; Office hours may vary from this. Feel free to make an appointment outside this time.
Robert Flynn, Teaching Assistant, r-flynn@northwestern.edu
Venn Ravichandran, Teaching Assistant, vennjr@northwestern.edu
Office hours and locations will be posted on Blackboard.
We will attempt to have a late Sunday afternoon session when homework is due on Monday.

Text:
The readings are from the textbook:

Homework:
Homework assignments are due on Mondays at the beginning of class, with a couple of exceptions. All work should be written legibly, work should be shown, and your answers should be clearly indicated. Pages should be stapled together.

Exams:
Exams will consist of multiple choice questions, short answer questions and some problems with calculations. Approximately 60% of the final exam will cover material since the 2nd exam. The rest will
be cumulative. You will be responsible for lecture material, handouts, and the readings on the exams. Exams always emphasize topics discussed in class. Students in the first discussion section should be prepared to sign a statement to the effect that they will not communicate with students in the later section about exam material.