**Biology 37 s15**  
**Endocrinology**  
**Weekly Schedule 10A**

**Lectures/Paper Discussions:** Tuesday and Thursday 10-11:50  
**X-hour:** Wed 3-3:50 (Problem-solving exercises & patient presentations)  
**Text/Reading:**  
1. **Text:** None required. Texts available on Course Reserve (Dana) (one also as e-text via Canvas link)  
2. **Course Reader:** Collection of 37 manuscripts together with study guides that are required course reading. Available at Wheelock Books. All are also posted as .pdf files on the course Canvas site. Some papers have supplemental data that is only on the Canvas site.  
**Faculty:** Professor Lee Witters

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Prob Set Posted</th>
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<tr>
<td>Tuesday, March 31</td>
<td>Lecture 1: Course Introduction and Overview of the Mammalian Endocrine System</td>
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<td>Wednesday, April 1</td>
<td><strong>NO X-HOUR</strong></td>
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<td>Thursday, April 2</td>
<td>Lecture 2: Hormone Receptors; Mechanisms of Hormone Action I</td>
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<td>Tuesday, April 7</td>
<td>Lecture 2 Reading; Lecture 3: Mechanisms of Hormone Action II</td>
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<td>Wednesday, April 8</td>
<td><strong>X-Hour:</strong> Problem-Solving in Endocrinology- Guide to Success</td>
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<td>Thursday, April 9</td>
<td>Lecture 3 Reading; Lecture 4: Pituitary and Hypothalamus-An Overview</td>
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<td>Tuesday, April 14</td>
<td>Lecture 4 Reading; Lecture 5: Hypothalamic/Pituitary/Gonadal Axis</td>
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<td>Wednesday, April 15</td>
<td><strong>X-Hour:</strong> Group Problem-Solving: A Mystery Case</td>
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<td>Thursday, April 16</td>
<td>Lecture 5 Reading; Lecture 6: Sex Steroids; Hormones of Pregnancy &amp; Lactation</td>
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<td>Friday, April 17</td>
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<td>Tuesday, April 21</td>
<td>Lecture 6 Reading; Lecture 7: The Adrenal Cortex and Its Hormones</td>
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<td>Wednesday, April 22</td>
<td><strong>X-Hour:</strong> Group Problem-Solving: Two Mystery Cases</td>
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<td>Thursday, April 23</td>
<td>Lecture 7 Reading; Lecture 8: Sexual Differentiation and Puberty</td>
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<td>Tuesday, April 28</td>
<td>Lecture 8 Reading; Lecture 9: Growth Hormone and Related Growth Factors</td>
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<td>Wednesday, April 29</td>
<td><strong>X-Hour:</strong> Patient Visit and Presentation</td>
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<td>Thursday, April 30</td>
<td>Lecture 9 Reading; Lecture 10: Thyroid Hormones</td>
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<td>Saturday, May 2, 6-8PM</td>
<td><strong>Mid-Term Exam Review Session</strong></td>
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<td>Monday, May 4, 7-9 PM</td>
<td>Mid-Term Exam</td>
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<td>Tuesday, May 5</td>
<td>Lecture 10 Reading; Lecture 11: Calcium-Regulating Hormones: PTH and Vitamin D</td>
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<td>Wednesday, May 6</td>
<td><strong>NO X-HOUR</strong></td>
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<td>Thursday, May 7</td>
<td>Lecture 11 Reading; Lecture 12: Hormone Production by “Non-Endocrine” Tissue</td>
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<td>Friday, May 8</td>
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<td>Tuesday, May 12</td>
<td>Lecture 12 Reading; Lecture 13: Fuel Homeostasis and Pancreatic Hormones</td>
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<td>Wednesday, May 13</td>
<td><strong>X-Hour:</strong> Group Problem-Solving: Two Mystery Cases</td>
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<td>Thursday, May 14</td>
<td>Lecture 13 Reading; Lecture 14: Diabetes Mellitus: History &amp; Molecular Pathogenesis</td>
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<td>Friday, May 15</td>
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<td>Tuesday, May 19</td>
<td>Lecture 14 Reading; Lecture 15: Body Weight: Obesity and Type 2 Diabetes</td>
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<td>Wednesday, May 20</td>
<td><strong>NO X-HOUR</strong></td>
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<td>Thursday, May 21</td>
<td><strong>NO CLASS</strong></td>
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<td>Tuesday, May 26</td>
<td>Lecture 15 Reading; Lecture 16: Body Weight: Anorexia Nervosa</td>
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<td>Wednesday, May 27</td>
<td><strong>X-Hour:</strong> Patient Visit and Presentation</td>
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<td>Thursday, May 28</td>
<td>Lecture 16 Reading; Lecture 17: Neoplasia &amp; Immunoendocrinopathy</td>
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<td>Tuesday, June 2</td>
<td>Lecture 17 Reading; Lecture 18: What is a Hormone Anyway?</td>
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<td>Thursday, June 4, 6-8 PM</td>
<td><strong>Final Exam Review Session</strong></td>
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<tr>
<td>Monday, June 8, 8-11AM</td>
<td><strong>Final Exam</strong></td>
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Companion Required Reading for Lecture Series

Note: Students are expected to read these papers prior to the class discussion; note that each set corresponds to the subject of the lecture in the previous class. Papers with * or ** are included as .pdf files on course web site. Papers with ** have photographs or color figures that should be looked at on the web site. Some papers have supplemental data included only on the web site, but should be consulted.

For Thursday, April 2: Course Introduction and Overview
Canvas Site Reading: Chapter 1, Principles of Endocrinology, in Williams Textbook of Endocrinology, Melmed, Polonsky, Larsen & Kronenberg, eds, 12th edition (e-text with link to Lecture 1 from Canvas ‘Syllabus’ page)

For Tuesday, April 7: Hormone Receptors: Mechanisms of Hormone Action I

For Thursday, April 9: Hormone Receptors: Mechanisms of Hormone Action II


For Tuesday, April 14: Pituitary and Hypothalamus: An Overview
**Kelberman, D et al (2009) Molecular analysis of novel PROPI mutations associated with combined pituitary hormone deficiency (CPHD), Clin Endo, 70, 96-103

**Siggaard, C. et al (1999) Clinical and molecular evidence of abnormal processing and trafficking of the vasopressin preprohormone in a large kindred with familial neurohypophyseal diabetes insipidus due to a signal peptide mutation, J Clin Endo Metab, 84, 2933-2941

For Thursday, April 16: Hypothalamic/Pituitary/Gonadal Axis


For Tuesday, April 21: Sex Steroids; Hormones of Pregnancy and Lactation


For Thursday, April 23: The Adrenal Cortex and Its Hormones


**Samuels, ME et al (2013) Bioinactive ACTH causing glucocorticoid deficiency, J Clin Endo Metab, 98, 736-742 [+supplemental data on website]

For Tuesday, April 28: Sexual Differentiation and Puberty


* Mystery case: A case of mistaken gender identity

For Thursday, April 30: Growth Hormone and Related Growth Factors

**Besson, A et al (2005) Short stature caused by a biologically inactive mutant growth hormone (GH-C53S), J Clin Endo Metab, 90, 2493-2499


For Tuesday, May 5: Thyroid Hormones

**Liu, Z et al (2011) Constitutive activation of the thyroid-stimulating hormone receptor (TSHR) by mutating Ile$^{691}$ in the cytoplasmic tail segment, PLoS ONE, 6, e16335


For Thursday, May 7: Calcium-Regulating Hormones


For Tuesday, May 12: Hormone Production by "Non-Endocrine" Tissue


For Thursday, May 14: Fuel Homeostasis and Pancreatic Hormones


For Tuesday, May 19: Diabetes Mellitus: Molecular Pathogenesis


For Tuesday, May 26: Body Weight: Obesity and Type 2 Diabetes


For Thursday, May 28: Body Weight: Anorexia Nervosa and Endocrine Dysfunction


For Tuesday, June 2: Neoplasia of Endocrine Glands/ Immunoendocrinopathy


✳ Knauf, JA et al (2005) Targeted expression of BRAFV600E in thyroid cells of transgenic mice results in papillary thyroid cancers that undergo dedifferentiation, Cancer Res, 65, 4238-4245
Biology 37 Course Goals, Format & Expectations

REQUIRED READING ON DAY 1 OF COURSE

I. General Course Goals

- To provide a broad overview of the endocrine signaling system and its function/dysfunction in humans
- To integrate aspects of molecular endocrinology and cellular biochemistry with in vivo physiology and pathophysiology
- To illustrate how the study of the molecular genetics, cell biology, biochemistry and pathobiology of an endocrine disorder reveals insights into the molecular/cellular mechanisms and physiology of normal endocrine function
- To introduce students to the biomedical literature and to learn some techniques of clinical/molecular investigation in a hypothesis-based, problem-solving paradigm

II. Course Format

The course will consist of 18 lectures/discussions on Tuesday and Thursday from 10-11:50 (with a break in the middle). Attendance at all classes is expected of each student; attendance at X-hours is optional, but encouraged (see below).

The discussion/lecture format will generally consist of an instructor-led discussion of important manuscripts from the biomedical literature (reading based on the previous class lecture on the same subject) in the 1st hour followed in the 2nd hour by a lecture on an different subject to prepare students for reading for the next class. For each class, these manuscripts (and their study guides) are required reading for the course and should be read in advance of the class. All students will be expected to participate in the discussion of these papers. Students will be grouped and groups will be specifically assigned as “commentators” to specific readings (the same groups will work together during X-hour problem solving). These groups will be changed in membership 2-3 times per term. At the end of each class, the papers for the next class will be introduced and students will be referred to a “preview podcast” on our web site to assist in the reading of the papers and study guides. This syllabus material contains lecture outlines, some important initial figures and a printout of a Powerpoint set on “What the Major Hormones Do”. These latter sheets may be helpful in summarizing in a “Notes’ view the information about each of the major hormones to be studied. All of these materials (and future materials) are (or will be) posted on the course web site.

III. Course Schedule

The course schedule is attached, indicating the lecture topic/reading discussions, dates of the examinations & pre-exam review sessions and critical dates regarding the posting & submission of the problem sets. Note that the reading discussion corresponding to a particular lecture occurs in the 1st hour of the next class.

IV. Required Readings/Study Guides

One-three manuscripts from the biomedical literature are assigned to correspond to the topics of Lectures 2-17. For each set, a study guide is included. The study guide is an important component to draw attention to the key points and to ask questions to guide your reading and study. These papers have been chosen for their seminal nature and, most importantly, their integration of molecular and physiologic information. All are based on a central aspect of endocrine physiology or pathophysiology in humans and are meant to illustrate important principles of endocrinology and the techniques used to discover them. Student should do the best they can in the initial reading of these papers and utilize other resources, (e.g. reference texts, medical dictionary) as necessary, to address unfamiliar details. We will discuss an overall approach to reading papers at the end of our 2nd class (review the following document; also
posted on our web site (‘Syllabus’ >> ‘Course Help’ >> ‘How to Read Papers in Bio 37’). All will be previewed (in class and with a “preview podcast” on the web site) and then discussed in the following class with Professor Witters. ALL students should be prepared to participate in those discussions, though specific groups will be assigned as “commentators” on each.

Participation, not the "right" answer(s), through comment or questions is the desired goal of this paper discussion. The principles that these manuscripts illustrate and the general content (not picky details) of each will be heavily represented in the problem sets and on the examinations; the study guides are good clues as to the nature of these principles. The papers also illustrate a number of techniques used in the analysis of the endocrine system and you will need to be familiar with what each technique measures and how and with the interpretation of data obtained from its application. Simply said, you will have more success in the class & get more out of our course if you actually do the reading & participate in the discussions! Re-reading the papers after the class discussion is an excellent idea! "Sticky" details of each reading can be reviewed during class, X-hour or office hours.

A list of the readings is attached to the course schedule. All the papers are available in a course reader that should be purchased from the Wheelock Books. .pdf files or links for readings are also on the course web site. Some papers contain color pictures or “difficult to photocopy” figures which are best viewed by looking at the .pdf file on your laptops. Others have on-line supplemental data not in the reader and must be accessed on the web site.

V. Course Evaluations and Grading

A. Problem Sets: Three (3) problem sets are assigned during the course, as indicated on the course schedule. They will be posted on the course web site (‘Assignments’) on the date indicated. Completed problem sets are to be submitted in HARD COPY by 10 AM on the date due (in class or in my office/dropbox) (122 LSC) AND ALSO digitally as a .doc or .docx file through the course web site. Each problem set will consist of one or more problems, characterized by a description of a subject or family with an endocrine disorder and some preliminary laboratory data. The general assignment in each instance will be to:

· State a hypothesis (or alternative hypotheses) that best explain the abnormal state at a cellular and molecular level
· Describe of an experimental approach as to how you would confirm your hypotheses and the anticipated results of such experiments that would allow such a determination.

A “mock” question/answer and general instructions for completion of problem sets are posted on the course web site (‘Assignments’). Students will be free to use any written resources to prepare their answers. Problem set #1 can be worked on with other members of the class (though each student must submit her/his own answer), while with problem sets #2 & 3 each student must work totally independently. In both instances, students are expected to adhere strictly to the Dartmouth Honor Principle (see below).

B. Examinations: There will be two exams (mid-term and "final"). Each will count equally toward the class grade. The "final" exam is non-cumulative, emphasizing only the material in the second half of the course, though principles & experimental techniques we have covered in the first half of the course are ‘fair game’. My policy is to only grant exemptions from scheduled exam time for a direct time conflict with other classes, for illness or for unavoidable absence from campus.

The general format of the exams will consist of narrative-style questions (with some use of matching/fill-in-the-blank format) that will be designed to assess the application (not just memorization) of course material in unique problem-solving situations. The 2014
exams (along with answer keys) are posted on the course website (‘Syllabus’ >> ‘Course Help’). Material for the exams will be drawn from class lectures/notes, PowerPoint slides accompanying each lecture/paper discussion AND the assigned manuscripts/study guides. Evening pre-exam reviews will be offered prior to both the mid-term and final.

C. Completion of Course Assignments

It is expected that all students will complete course assignments on the date and time that they are scheduled. My policy is to give deferral only for illness, unavoidable absence from campus or a direct conflict with a scheduled activity of another class (in the case of the exams). Communication by the student with me about any deviation from this policy is expected of all students before the fact, not afterwards. For late submission of problem sets, there will be a 25% reduction in the grade for each day it is late.

D. Course Grading

The course grade will be determined by (1) completion of all course assignments, (2) the number of accumulated course points and (3) by course “engagement” (see below); the class will be graded on a curve, not “cutoffs”. The policy of the Biology Department is that a minimum of 50% of total possible points must be earned to achieve a passing grade. Historically, the median grade in this course has been in the B+ range, but I do not feel held to that, depending on overall class performance (in either direction). All grading is done by me. Graded problem sets and exams will be returned in my office (122 LSC) and can be picked up during my announced office hours. Note: You will have two (2) weeks after I announce their availability to pick them up and to request any re-grading then. After that, they will be discarded and grades are then final.

Breakdown of course points (total 180 possible):

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<th>Assignment</th>
<th>Points</th>
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<tr>
<td>Problem sets</td>
<td>60</td>
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<tr>
<td>Mid-term examination</td>
<td>60</td>
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<tr>
<td>Final examination</td>
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While I will not assign a specific point value to it, I do take into account what I term “active engagement and participation” in the course in assigning the final letter grade. Is there evidence that the student is intellectually engaged with the course, is providing interesting insights to peers and is contributing to the general learning atmosphere of the course? Ways students can demonstrate this include:

- active participation in class (through questions or comments, particularly during discussion of our papers)
- good use of office hours and the X-hour for same
- posting of comments or questions on ‘Piazza’ on the web site
- bringing new or recent insights to the attention of us all (e.g. posting an interesting article, image or URL in ‘Piazza’); commentary from others on these postings.

Taken together, this does provide you an opportunity to influence your final letter grade, but I will look for evidence that you have done these things throughout the course and not just intermittently or towards the end of the course. Note: this also means that course points yielding your “numerical” standing relative to the class DO NOT guarantee a certain letter grade.

You are urged to review the documents entitled ‘Tips for Success in Bio 37’ and ‘How to Read Bio37 Papers’ at the end of this syllabus. Also posted in the ‘Syllabus’ >> ‘Course Help’ section of our website.
VI. Course Text, Readings, Reserve Books, Web Sites, Lecture Capture & Lecture Tools

A. Course Text: I am not recommending or requiring a course text. There are reference texts on Course Reserve in Dana and one of these is also available on-line as an eResource (see below; Williams text) that can be linked to from our web page (‘Syllabus’>>’Useful Web Links’).

B. Required Manuscript Readings are available in a course reader that should be purchased from Wheelock Books. Some papers contain color pictures or “difficult to photocopy” figures and are best viewed by looking at the .pdf file on your monitors. Others have on-line supplemental data which are not in the reader and must be accessed on the course web site.

A list of readings is attached to the course schedule. Each required paper is accompanied by a study guide, highlighting some areas to concentrate on and questions to consider during your reading. Use of reference texts, medical dictionaries and other supplementary sources is encouraged; vocabulary may be an issue during reading and these other sources could prove helpful. Listening to the “preview podcast” before reading the paper is a great way to orient yourself before working with the papers & the study guide. We will review in class a strategy for reading/studying papers after our 2nd lecture (see document “How to Read Papers in Bio37’ in ‘Syllabus’>>’Course Help’ section of web site; also attached).

C. Valuable Reference Materials

1. On Reserve at Dana Library

2. eBooks There are several other excellent reference books available as eBooks you can link to it via ‘Useful Web Links’ of our web site (‘Syllabus’). The Williams textbook can be linked to directly from this page.

D. Valuable Web Sites (links on course web site in ‘Useful Web Links’ (‘Syllabus’ page))

There are a number of very useful web sites for this course. Please let me know if you find other sites that you think would be useful for this course.

E. Course Web Site
   http://canvas.dartmouth.edu

Canvas is Dartmouth’s learning management system. Academic Technologies has prepared a series of short videos and help pages and you are encouraged to acquaint yourself with these early in the term (see ‘Canvas Tutorials’ on ‘Syllabus’ page) if you are not already familiar with them.

On Day One of the course, please set up your e-mail contact information, as I will be using this mode to communicate with you during the course. I would suggest selecting “As Soon as Possible” so that you learn promptly about course issues. Instructions how to do this are in ‘Canvas Tutorials’ on ‘Syllabus’ page.
On Day One, also take a tour of the Canvas site to see how it is organized. The site is organized with a ‘Syllabus’ page (which has several links to general course pages and course aids), a ‘Calendar’, individual pages devoted to each course lecture topic (each of which, in turn, contains preview podcasts, .pdf files of some (but not all) of the readings, Powerpoint slides), an ‘Assignments’ section for problem sets and old exams, a ‘Piazza’ section for asking questions and posting interesting material and a ‘Grades’ section. There is also a ‘Chat’ section that we can use for text chats, as needed/scheduled, during the term. You will also find a link to the EchoCenter for lecture captures (below) from the ‘Syllabus’ page (also linked to from all of the lecture topic pages.

I STRONGLY encourage the viewing of the Powerpoint files on your computer (the animation and color can be very helpful) Some also like to print these out. They will be uploaded prior to each class, typically the weekend before the lectures for the coming week. PP sets for reading discussions will be uploaded only on the morning of the discussion; I want you to have “a crack” at the papers without it.

F. Lecture Capture/Podcasts

We will be using the Echo lecture capture recording system in place in 200 LSC this term. These files will be available within a few hours of the lecture in a link on the ‘Syllabus’ page and from each lecture topic page. The video will capture my computer screen, not the room, me or you! Any laser pointing will not be seen. While I do NOT regard this as a substitute for class attendance, it might be helpful for several of you if you have an unavoidable absence from class or would simply like to review aspects of a lecture or discussion (you can start and stop me!). Historically, many students have found these useful as a course study adjunct. However, there are things we do in class that are not easily captured with these technologies (especially classroom discussions, student questions). Each ‘Course Topics’ page will also contain a “preview podcasts” to orient you to the reading assignment.

Keep in mind that there is NO GUARANTEE that this Echo technology will work to effectively capture every lecture, so DO NOT rely on this system as a substitute for class attendance!

G. Lecture Tools

This term we will be using a learning element, Lecture Tools, which has been incorporated into our Canvas site. Lecture Tools is an interactive program that allows extended faculty-student engagement in the classroom setting, providing, among other things, platforms for asking/answering questions. You should each create an account so that you can take advantage of this as we use it, largely in X-hours and & pre-exam reviews. To do this, go to our Canvas site and click on ‘Lecture Tools’ on the ‘Syllabus’ page. Follow the instructions (including a screencast) to create your account. If you have difficulties setting up an account after you have registered for the course (it may take a day for you to appear in my course roster after you register), let me know. We will have a class demo to show you how this works and how we will use it during our first scheduled X-hour.

VII. Office Hours; Use of X- hour

Office hours will be announced at each class session and through our Canvas site each week. Students are asked to sign up for times in class, though you can ALWAYS walk-in! My office is located in the Class of 1978 Life Sciences Center (Room 122; map at end of this syllabus and on web site). Students are encouraged to drop by to ask questions, review material, discuss papers or just chat about life, career plans, the Red Sox vs Yankees, politics, art history, the cosmos, iTunes/Spotify favorites, etc! It is very important to me to "make the class smaller" by encouraging students to come by, even for seemingly minor issues and questions or for going beyond course material. Everyone of
you is important to me regardless of your background in biology & your present/future plans. I value very much these interactions and want to get to know you all better!

Office hours also offer you the opportunity of being PROACTIVE AND CURIOUS in your approach to your education, even if you feel in command of the material we are covering, is important. If you don’t feel in command, don’t wait till you “see how you do” on the 1st problem set or mid-term!

The X-hour is optional and will be used to ask questions, group problem-solving, review material, etc. We will also have two patient visits. Students are encouraged to attend for all these purposes. No new material not otherwise covered in class will be introduced during these sessions. However, nearly all past students who have taken this course have said they have found the X-hour to be VERY useful to their study.

VIII. Dartmouth Academic Honor Principle

The Dartmouth College Student Handbook states: "Fundamental to the principle of independent learning are the requirements of honesty and integrity in the performance of academic assignments, both in the classroom and outside. Dartmouth operates on the principle of academic honor, without proctoring of examinations. Any student who submits work which is not his or her own, or who commits other acts of academic dishonesty, violates the purposes of the College and is subject to disciplinary actions, up to and including suspension or separation.

There are a number of situations in which a student in Biology 37 might find himself or herself tempted to violate the Academic Honor Principle. These situations include (but are not limited to) the following:

a) Examinations must be completed without reference to written materials other than those provided with the exam paper and must be completed without communication with anyone else (the only permissible exception is that students may request clarification of any exam question from me during the exam). The answers that you provide must be entirely your own work. Cell phones & PDAs must be turned off and left in the room, if you leave it during the exam.

b) My policy permits the re-submission of exams for potential re-grading by me. Any alteration of the answers between the time when the graded papers were returned to the student and the time when the paper was submitted for re-grading constitutes a breach of the Academic Honor Principle. To deter this practice, I randomly scan exams after grading them.

c) The assigned problem sets can be completed in an "open book" mode, that is, you may access any source of written or information relevant to the problem. For problem set #1, you are free to discuss the problem with any others in the class. However, you are expected to “write up” & submit your own answer without collaboration with others. For problem sets #2 & 3, students are expected to work totally independently of each other and cannot seek verbal/e-mail/text explanation from others, including NOT sharing with anyone ANY materials (or their source) relevant to the problem.

d) Any form of plagiarism on the problem sets, namely the submission or presentation of work, in any form, that is not the student's own without acknowledgement of the source, violates the Academic Honor Principle. Students are responsible for the information concerning plagiarism found in the Sources: Their Use and Acknowledgement, at http://www.dartmouth.edu/~sources/Electronic, as well as ‘hard copy’, submission of all work is required and the former may used to compare papers between students or to other sources.

Honesty is the foundation of the academic pursuit of knowledge. In recognition of this, I will not overlook any violations of the Academic Honor Principle. Indeed, the Faculty Handbook of Dartmouth College states explicitly that College Faculty is obligated to report potential violations of the Academic Honor Principle to the Dartmouth College Committee on Standards.
IX. Course Accommodations

Students with disabilities, including chronic diseases, learning disabilities, and psychiatric disabilities are encouraged to discuss with me after class or during my office hours appropriate accommodations that might be helpful. Please do this EARLY in the course and not just before the 1st exam. I have worked closely with the Academic Skills Office in the past and can work with students to find study methods, tutoring needs and exam accommodations for those eligible for same.

X. Religious Observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me early to discuss appropriate accommodations.