**Syllabus for BI 301-001: Human A&P I ~ Lecture ~ Portland State University**

**Course Number:** Bi 301 ~ Section 001 / CRN 80157  
**Course Title:** Human Anatomy & Physiology I  
**Term/Year:** Summer 2015  
**Meeting Times:** M,T,W,Th 8 – 10:50 am @ Cramer Hall 150  
**Professor Name:** Dr. Thomas V. Hancock (Ph.D.)  
**Contact Information:** Office: CLSB South Tower 5S_066 / SRTC 236  
Phone: 503-725-2331 / Email: thancock@pdx.edu  
**Office Hours:** Directly after lecture and by appointment  

*Note:* I cannot encourage use of an older edition of this book or use of another book, cheap copies exist online.

**BI301L:** The accompanying laboratory (301L) is run as a separate course although the information is integrative with the lecture. All labs are located in the CLSB South Waterfront Building in Rooms: 2N108A, 2N109 in the North Tower. You will receive one single grade combining your lab and lecture score. You are absolutely required to attend laboratory the first day of the quarter and may lose your spot if you are more than 15 minutes late. Information for the laboratory can be found on the laboratory syllabus within the D2L website for BI 301L.

**Learning Objectives:**
- Review introductory material on chemistry and basic cellular structure and function  
- Understand the responsibilities of each major organ system in the human body  
- Understand the constant themes of form & function and the ways in which homeostasis maintains a constant environment in the body  
- Understand the defining features of tissues and the major tissue types in the body  
- Understand the integumentary system  
- Understand the skeletal system  
- Understand skeletal muscle including action potentials which also operate in the nervous system  
- Understand smooth muscle, similarities and differences from skeletal muscle, and the major organ systems in which it plays a part

**Skills Development:**
- Be able to define at the cellular level how homeostatic control systems are initiated and how they maintain equilibrium  
- Identify the various ways that different anatomical forms can enact various functions  
- Identify the features of each tissue type that enable it’s unique role in the body  
- Identify the mechanisms within the integumentary system that allow it to protect the body form both physical disturbance and pathogens and maintain itself following damage  
- Identify the mechanical properties of bone that allow it to act as a scaffold for the muscular system to act upon and translate skeletal muscle contraction into movement and how the bone develops and is maintained  
- Identify the important part that bone plays in homeostasis of various ions such as calcium  
- Identify the ways that chemical energy is transduced to mechanical energy within skeletal muscle and how various forms of muscle are designed for varying functions  
- Identify the systems in which smooth muscle is important and the ways that variations of smooth muscle allows a wide variety of function  
- Identify gross anatomical structures associated with these various systems, primarily in lab but also in lecture  
- Identify histological structures associated with the systems of study  
- Explain how the manipulation of a specified variable might affect a given body system.  
- Explain how the form and function of each system relates  
- Explain how selected pathologies of these systems affect their function  
- Explain the basis of selected drugs or treatments.
Course Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Outline of Lecture Topic</th>
<th>Text Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon June 22</td>
<td>Introduction/ Chemistry/ Biochemistry / Membranes</td>
<td>1, Atlas A, 2, 3</td>
</tr>
<tr>
<td>Tues</td>
<td>Cells / Introduction to Tissues</td>
<td>5</td>
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<tr>
<td>Wed</td>
<td>Tissues</td>
<td>5, 26</td>
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<tr>
<td>Thur</td>
<td>Integument, bone</td>
<td>6, 7</td>
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<tr>
<td>Mon June 29</td>
<td>Exam 1: (Chapters 1,2,3,5,26)</td>
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<td></td>
<td>Lecture will occur following exam: Bone</td>
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<tr>
<td>Tues</td>
<td>Bone / Skeleton/ Joints</td>
<td>7, 8, 9</td>
</tr>
<tr>
<td>Wed</td>
<td>Skeletal Muscle / Action Potentials</td>
<td>10, 11, 12</td>
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<tr>
<td>Thur</td>
<td>Exam 2: (Chapters 6-9).</td>
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<tr>
<td></td>
<td>Lecture will occur following exam: Skeletal Muscle</td>
<td>10, 11</td>
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<tr>
<td>Mon July 6</td>
<td>Skeletal Muscle</td>
<td>10, 11</td>
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<tr>
<td>Tues</td>
<td>Skeletal Muscle</td>
<td>10, 11</td>
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<tr>
<td>Wed</td>
<td>Skeletal Muscle / Joints / Smooth Muscle</td>
<td>10, 9, 11</td>
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<td>Thur</td>
<td>Final Exam: (Chapters 9-12 + Comprehensive portion)</td>
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- *See reading assignment below for specifics on reading within each chapter.*

Grading Scheme:

<table>
<thead>
<tr>
<th>Exams</th>
<th>% of Course Grade</th>
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<tbody>
<tr>
<td>Lecture Exam 1</td>
<td>18%</td>
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<tr>
<td>Lecture Exam 2</td>
<td>18%</td>
</tr>
<tr>
<td>Lecture Exam 3</td>
<td>24%</td>
</tr>
<tr>
<td>Laboratory</td>
<td>40%</td>
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<td></td>
<td>100%</td>
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Assigned Grades will be based on the following scale:

- A =93-100%
- B =83-86%
- C =73-76%
- D =63-66%
- A- =90-92%
- B- =80-82%
- C- =70-72%
- D- =60-62%
- B+ =87-89%
- C+ =77-79%
- D+ =67-69%
- F <=60%

- The instructor reserves the right to make the curve more generous than stated above
- There is NO opportunity for extra credit.

- **Exams:** Lecture exams are multiple choice, Exams 1 & 2 are 50 questions in length, and Exam 3 is 67 questions with 50 questions on Chapters 10-12 and 17 questions covering all previous material in a comprehensive portion. Copies of old exams will be made available within the D2L site. Please bring a scantron form to class with you for all exams, Form SC982-E (available in bookstores, full page sized blue form) is the only form that can be used. Please bring your PSU student ID to class, these will be checked when turning in exams.

  There are NO makeup exams. You must take EVERY lecture exam and lab practical at the assigned time. These can only be made up in the event of documentable emergencies, in which case an incomplete grade will be assigned and the exam will be made up the following summer or fall when the course is offered again. You must be passing the course with a C- or better and only a single exam or practical can be made up in this manner.

- **Disability Resource Center:** If you are a student with a documented disability and are registered with the Disability Resource Center, please file your paperwork and contact me (the instructor) immediately to facilitate arranging academic accommodations. No accomodations for lecture or lab can be made without filing the proper paperwork.
- **Academic honesty statement:** Cheating or any kind of academic dishonesty will not be tolerated. Students caught cheating will, at a minimum, receive a zero on the exam and be reported to the office of the Dean of Student Life at PSU. If you are unclear about the policies related to academic misconduct and the student conduct code, see: http://www.pdx.edu/dos/psu-student-code-conduct.

- **D2L:** The “Desire to Learn” online software will be used to communicate important information in the course and to deliver important documents. Please be sure you are aware how to access the course website as soon as the course starts (D2L.pdx.edu). Login with your PSU username and password.

- **Attendance:** Students are expected to attend all lectures and required to attend all lab meetings. Please arrive in a timely manner. However, you do not need to notify me of your absence from lecture as role is not taken but it is incumbent upon you to get the information from lecture from another student. Lecture material is vital to your success in the course and you are unlikely to be successful without paying close attention to lecture notes.

- **Echo 360:** The lecture during the summer will not be recorded, but my BI301 lecture from last fall was recorded and basically covers the same information (but not exactly) and utilizes a similar outline. DO NOT miss class, use this as an opportunity to review material. This is located at:
  
  https://echo360ess.ohsu.edu:8443/ess/portal/section/57950f81-c79e-4836-ae72-3ac9b3fe06ef

- **Problem Sets:** Problem sets will be assigned throughout the quarter. These are not turned in or graded and answers are not provided. While not comprehensive for the material (not a study guide), examples of most categorical concepts will be included, and most logical process based topics will be covered. Problem sets are a very good indication of the range of material that the instructor finds reasonable to place upon the exams. You may review the problem sets during office hours.

- **Study Skills:** This is an advanced biology course. Students should be prepared to spend a great deal of outside time on this course. Keeping up on the material is imperative, and studying a lecture within a day will allow you to better comprehend the following lecture. Reading alone will be substantial … but reviewing notes, doing problem sets, and laboratory work will also require a great deal of time. Lecture material may be reviewed with the instructor during office hours.

- **Prerequisites:** Introductory biology and chemistry prerequisites are not enforced, but are very helpful for the highly integrative nature of this course.

- **Reading Assignments and Studying for the Course:** My general advice for studying is to survey the reading beforehand to become familiar with the general systems, and especially to become familiar with the vocabulary, so that you will be able to comprehend the lecture which proceeds quickly. I have detailed the reading for each chapter specifically as to what is more or less important as we proceed through the course. After attending lecture, study your notes and use your textbook to understand the concepts that I emphasize in lecture as that is what will primarily be tested on the exams. Problem Sets should be used to determine whether you understand the material after studying it, and are especially good for group work or studying with a friend.

- **Ensuring a safe and welcoming campus:** This applies to all new and returning students. If you have not done so already, please complete the Safe Campus Module in d2l. The module should take approximately 30 to 40 minutes to complete and contains important information and resources. If you or someone you know has been harassed or assaulted, you can find the appropriate resources on PSU’s Enrollment Management & Student Affairs: Sexual Prevention & Response website at http://www.pdx.edu/sexual-assault/. PSU’s Student Code of Conduct makes it clear that violence and harassment based on sex and gender are strictly prohibited and offenses are subject to the full realm of sanctions, up to and including suspension and expulsion.

**BI 301 Lecture Reading Assignments & Lecture Outline**

Reading and Outlines are listed separately for the material covered by Exam 1, Exam 2 and Exam 3. Lecture outlines are listed here for each section of the course to help students keep pace with the lecture material, but are subject to change. Reading Assignments indicate the most pertinent material in each chapter. Note: “Deeper Insights” subsections of the book are not required material unless specifically mentioned during lecture. If mentioned, they are good to read but only required to understand at the level discussed during lecture. Everything else in the assigned sections of the book is fair game though I
strongly emphasize what is discussed in lecture on exams. Remember though that if you are trying to become a clinician of any kind, reading ALL of the book will help you become a better one and understand the material more comprehensively. The pertinent reading is important, it gives you a second perspective on the material and is generally well written and organized and will increase your understanding of the lecture material.

Exam 1 Reading Assignment:

- Chapter 1, Major Themes of Anatomy and Physiology: Focus on Section 1.5 onwards
- Atlas A, General Orientation to Human Anatomy: Read this … some for lab / some for lecture. Note that not ALL anatomical terms are required for lab, use the provided laboratory bone and muscle list to find specifics.
- Chapter 2, The Chemistry of Life: Review all as necessary (we presume you have had a year of introductory biology and chemistry so most of this should be review), Emphasis upon: 2.2 Water, Measures of Concentration, Acid/base; 2.4 Organic Compounds.
- Chapter 3, Cellular Form and Function: Review all as necessary (we presume you have had a year of introductory biology and chemistry so most of this should be review).
- Chapter 5, Histology: Sections 5.1 - 5.4 are the most pertinent material to read. If you look at it before class, you will have the basic tissue terminology in your head. We will cover the basics of 5.5, and do very little in section 5.6.
- Chapter 26, Nutrition and Metabolism: I will cover the very basics of Glycolysis and Aerobic Oxidation of fuels in class. You will ONLY have to know it to the extent that I lecture on it, but Ch. 26 p. 1012 - 1023 (26.2 & 26.3) explains it in much greater detail.

Exam 1 Lecture Outline:

A. Introduction
   1. Anatomy & Physiology
   2. Levels of Organization
   3. Organismal Characteristics
   4. Homeostasis
      a. Homeostatic Control Systems: Features
      b. Negative Feedback
      c. Precision & Setpoints
      d. Ex. Temperature Regulation
      e. Other Homeostasis Examples

B. Organ Systems (see Powerpoint 1.1)
   C. Chemical Concepts
      1. Chemical Reactions
      2. Enzymes
      3. Elemental Composition:
         a. Water:
         b. Acid/Base
         c. Macromolecules
            a. Carbohydrates:
            b. Lipids
            c. Proteins
   d. Nucleic Acids: DNA & RNA
   D. Cell Components
      1. Plasma Membrane
      2. Proteins:
      3. Solute Composition:
         a. Diffusion: High to Low … downhill
         b. Osmosis:
         c. Carrier Mediated Transport
   E. Tissues (see accompanying Powerpoint 1.2)
      1. Defining Tissues
      2. Histology
      3. Primary Tissues
         a. Nervous Tissue
         b. Muscle Tissue
         c. Epithelial Tissue
         d. Connective Tissue (CT)
   F. Junctions & Glands
      1. Junctions
      2. Glands
   G. Glycolysis and Aerobic Oxidation
**Exam 2 Reading Assignment:**
- Chapter 6, Integumentary System: Emphasis upon 6.1 - 6.3
- Chapter 7, Bone Tissue: All
- Chapter 8, The Skeletal System: this is primarily anatomical information as covered during your laboratory. There are a handful of things that I will discuss during lecture (that are not covered by the lab) that are explained in this chapter such as: “The skull in infancy and childhood”; aspects of the vertebral column such as “intervertebral disks”, and deeper insight 8.4. If you have time to read this chapter, it will help you integrate information that you memorized in lab and perhaps make more sense of it … but for the most part my lecture will cover all topics touched by this chapter and you should not feel compelled to do much except scan it (except the specific sections mentioned above) in order to succeed on the lecture exam.
- Chapter 9, Joints: Up to page 291 until “Movements of Synovial Joints”. I will touch briefly upon several topics in the latter part of the chapter, but the lecture will cover that material comprehensively.

**Exam 2 Lecture Outline**

A. Integumentary System  
1. Structure  
2. Function  
3. Characteristics  
4. Strata  
   a. S. Germinativum (basale)  
   b. Spinosum  
   c. Granulosum  
   d. Lucidum  
   e. Corneum  
5. Skin Color  
   a. Melanocytes  
   b. Carotene  
   c. Circulation  
6. Dermis  
7. Hypodermis  
8. Accessory Structures of Skin  
   a. Hair  
   b. Nails  
   c. Cutaneous Glands  
   d. Sensory Structures  
9. Wound Healing  
10. Burns  

B. Cartilage

C. Skeletal System  
1. Function  
2. Composition:  
   a. Matrix  
   b. Cellular  
3. Structure  
   a. Bone Tissue  
   b. Shape  
   c. Bone Marrow  
   d. Inner / Outer Layers  
   e. Special Forms  
4. Osteogenesis  
   a. Endochondral Ossification  
   b. Intramembraneous Ossification  
5. Bone Growth  
6. Bone Remodeling  
7. Hormones Affecting Bone Growth  
   a. Growth Hormone  
   b. IGF  
   c. Pathophysiology of GH/IGF  
   d. Sex Hormones  
   e. Cortisol  
   f. Thyroid Hormone  
8. Calcium Homeostasis  
   a. Effects  
   b. Homeostasis: Hypocalcemia  
   c. Homeostasis: Hypercalcemia  
   d. Calcium Disorders  
9. Articulations  
   a. Synarthroses  
   b. Amphiarthroses  
   c. Diarthroses  
   d. Synovial Supporting Structures  
   e. Movements of synovial joints  
10. Bone and Joint Disorders
Exam 3 Reading Assignment:
- Chapter 11, Muscular Tissue: All of this material is applicable and should be read.
- Chapter 12, Nervous Tissue: Pages 451 (section 12.4) – 458 (up to Myelinated fibers). This is an explanation of action potentials and graded local potentials that also explains excitation seen in skeletal muscle fibers. We will cover this material as soon as Friday Nov. 15th.
- Chapter 9, Joints: 284-288 (lever systems and range of motion)
- Chapter 10, The Muscular System: Most of this chapter is oriented towards lab, but there is some material in this chapter that is applicable to lecture. Pages 313-317 have some useful tidbits about basic function of muscle, and shapes of muscles that we will touch on at the very end. Sections about Functional groups of muscles, muscles innervation, and blood supply are useful (p. 318 and 319), and the clinical application on p. 374 is interesting though not on the exam unless I mention something specifically in lecture.

Exam 3 Lecture Outline:
A. Skeletal Muscle
   1. Function
      a. Force Generation: attempts to shorten
      b. Thermoregulation
   2. Structure
      a. Macro Architecture
      b. Microstructure
      c. Sliding Filament Theory
      d. Pathophysiology: MD
   3. Resting Membrane Potential
      a. Nernst Equation
      b. Goldmann-Hodgkin-Katz (GHK)
   4. The Neuromuscular Junction
   5. Action Potentials
      a. Voltage-Regulated Sodium Channels
      b. Voltage-Regulated Potassium Channels
      c. Propagation of AP to Sarcotubular System
   6. Electrochemical Coupling
   7. Contraction
   8. Relaxation
B. Muscle Twitches & Summation
C. Muscle fiber Types
   1. Fiber Types
   2. Speed of Contraction
   3. ATP Generation
      a. Phosphocreatine
      b. Anaerobic Glycolysis
      c. Aerobic
   4. Whole muscle
D. Determinants of Force
   1. Optimal Length
   2. AP Frequencies: Summation
   3. Motor Unit Recruitment
   4. External Resistance = Load
   5. Muscle Size
   6. Muscle Shape
   7. Architecture of the Joint
   8. Cooperative vs. Antagonistic
   9. Muscle Fiber Type
   10. Conclusion
E. Smooth Muscle