I. **Announcements**: Please check & sign attendance roster. Not on list? See Pat during break/class. *Lab 1 Histology* Thursday, 10 am – 5 pm sections in 130 HUE. Much fun!!

II. **Introduction**: Staff, office hr, required sources, course overview, grading, expectations & success. Q?

III. **Human Physiology** LS ch 1, DC Module 1,
   A. What? cf: Anatomy LS p 1
   B. Where? Body Levels of Organization LS pp1-6, DC pp1-5
   C. How? Different Study Approaches LS p 1

IV. **Homeostasis** LS ch 1, DC Module 1
   A. What? Maintenance of ECF LS p 8
   B. Where? ECF = Plasma + Interstitium LS fig 1-4 p 8
   C. How? Simplified Homeostatic Model cf: LS fig 1-7 p 14
      Balances LS p 9, DC pp 5-6
   D. Why? Cell survival! LS fig 1-5 p 9, DC p 5

---

*Welcome to Human Physiology – what makes us tick!*
<table>
<thead>
<tr>
<th>Day &amp; Time</th>
<th>Instructor</th>
<th>Place</th>
<th>e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>T 10-11 am</td>
<td>Pat Lombardi+</td>
<td>65A Klamath</td>
<td>lombardi</td>
</tr>
<tr>
<td>T 11 am-12n</td>
<td>Erik Burlingame</td>
<td>32 Klamath</td>
<td>eburling</td>
</tr>
<tr>
<td>W 12n-1 pm</td>
<td>Hannah Soukup</td>
<td>488 Onyx</td>
<td>hsoukup</td>
</tr>
<tr>
<td>F 9-10 am</td>
<td>Hannah Soukup</td>
<td>488 Onyx</td>
<td>hsoukup</td>
</tr>
</tbody>
</table>

+and by appointment. Please call 346-6055.
**Human Body Systems**
Structure, Function, and Environment
SECOND EDITION
2013

Daniel D. Chiras

**Introduction to Human Physiology**
Department of Biology, BI 121
Laboratory Manual
University of Oregon
Eugene, OR 97403
Fall 2016

**DC**
New $30.75 Used $23.25 e-Book $15.75

**LM**
Lab Notebook $ 9.85

http://uoduckstore.com/
BL 121 Optional Sources @ Smith Family Bookstore
...Primestudent, Valore Books or Amazon.com

New $239.95-360.95 Used $65.10-159.82 e-Book $106.99-136.00

Publisher’s Price → Gold Nuggets?
Dr. Evonuk’s 6 Balances

- Metabolic
  - ANA-
  - CATA-

- 

- \( \text{H}_2\text{O} \)

- \( \text{ToC} \)

- \( \text{O}_2/\text{CO}_2 \)

- Ion\(^{+/-}\)

- pH
Mitochondria: Energy Organelles

fig 2-8 LS 2012
What does DNA look like? Double-helix!!
What are DNA’s major functions?
Heredity + Day-to-Day Cell Function
Dietary Analyses: SuperTracker + Diet Organizer!
Dietary Composition & Physical Endurance

eg, Atkins!

High-fat diet
Normal mixed diet
High-carbohydrate diet

~ 1/3 endurance!

Maximum endurance time:
57 min
114 min
167 min
Digestion Steps

1. Ingestion
2. Mechanical Digestion
3. Chemical Digestion
4. Peristalsis
5. Absorption
6. Storage
7. Defecation

Cardiovascular System
Figure-8 Loop

Pulmonary System

Systemic System

Pulmonary circuit
- Pulmonary arteries
- Vena cavae
- Pulmonary veins
- Aorta and branches
- Right ventricle
- Left ventricle

Systemic circuit
- Arterioles
- Venules

Capillary beds of lungs where gas exchange occurs
Capillary beds of all body tissues where gas exchange occurs

Oxygen-poor, CO$_2$-rich blood
Oxygen-rich, CO$_2$-poor blood
Atherosclerosis developing within vessel walls!
CABG ≡ Coronary Artery Bypass Graft
Cigarette Smoking: #1 Preventable Cause of Premature Death in the US
How much aerobic?

Continuous exercise
> 50% muscle mass
> Conversational pace
20-60 min/session
3-5 days/wk
Healthy Oils to Minimize Atherosclerosis

HAPOC?
With the right food choices, physical activity, and not smoking, we could prevent about ~90% of diabetes, 80% of heart disease & 70% of stroke!

“With the right food choices, physical activity, and not smoking, we could prevent about 80 percent of heart disease, about 90 percent of diabetes, and 70 percent of stroke,” says Walter Willett, chair of the nutrition department at the Harvard School of Public Health in Boston. “Those are the three pillars. They really do make a difference.”

The right food choices are simple: Eat less red meat, sweets, refined grains, and salt, and drink fewer sugary beverages. Replace unhealthy foods with vegetables, fruit, beans, and whole grains, and with smaller amounts of fish, poultry, and low-fat dairy. Those foods aren’t just good for our health. They can also help protect the Earth.

Here’s why—and how—to eat real.

Continued on page 3.
(a) A pressure-recording device, inflatable cuff, and stethoscope are used to measure blood pressure.

(c) When blood pressure is 120/80:
- Cuff pressure is greater than 120 mm Hg.
- No blood flows through vessel.
- No sound is heard.

- Cuff pressure is between 120 and 80 mm Hg.
- Blood flow through vessel is turbulent whenever blood pressure exceeds cuff pressure.
- Intermittent sounds are heard as blood pressure fluctuates throughout cardiac cycle.

- Cuff pressure is less than 80 mm Hg.
- Blood flows through vessel in smooth, laminar fashion.
- No sound is heard.
What's in Blood? Plasma & Blood Cells

- Plasma (55% of whole blood)
- Buffy coat: platelets and leukocytes (<1% of whole blood)
- Erythrocytes (45% of whole blood)

- Platelets
- Leukocytes (white blood cells)
- Erythrocytes (red blood cells)
Glucose: Sugar in Blood

Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: ≥ 126 mg/dL
Times of Plenty!!

NB: Diabetics have problems either here or here.

---

Fox 1987
ANP = Atrial Natriuretic Polypeptide
Motor

M. Supplementary motor area (on inner surface—not visible; programming of complex movements)
M. Premotor cortex (coordination of complex movements)

Central sulcus

Sensory

S. Primary sensory cortex (sensation)

A. Posterior parietal cortex (integration of somatosensory and visual input; important for complex movements)
A. Wernicke’s area (speech understanding)
A. Parietal-temporal-occipital association cortex (integration of all sensory input; important in language)
S. Primary visual cortex surrounded by higher-order visual cortex (sight)

A. Limbic association cortex (mostly on inner and bottom surface of temporal lobe; motivation and emotion; memory)
M. Primary motor cortex (voluntary movement)

Key
M. Motor cortex
A. Association cortex
S. Sensory cortex
Homeostasis is a **dynamic balance** between the autonomic branches.

- **Rest-and-digest:** Parasympathetic activity dominates.
- **Fight-or-flight:** Sympathetic activity dominates.
Muscular System

Body systems maintain homeostasis.

Homeostasis is essential for survival of cells.

Cells make up body systems.

Cells

Homeostasis

© Brooks/Cole - Thomson Learning

LS ch 8 p 202
Atrophy
*decrease in size & strength*

Hypertrophy
*increase in size & strength*
**NB: In vivo, Cupola or peak of each lung goes into neck > clavicle line!**
Not only the Brain, but the Heart & 100s of Other Tissues and Organs are Adversely Affected!
I ♥ U of O!

Students who succeed are usually those who:

(1) **Attend** class regularly
(2) **Ask** questions
(3) **Come** to office hours & problem-solving sessions
(4) **Study** outside class both alone & in study groups
(5) **Seek** to understand methods & overarching principles/concepts rather than specific answers
(6) **Teach** or tutor others &
(7) **Discuss** concepts informally with fellow students.

ANATOMY vs PHYSIOLOGY
STRUCTURE vs FUNCTION
WHAT? vs HOW?
WHERE? vs WHY?
Structure begets function!
Structure gives rise to function!
Structure & function are inseparable!
Knee Structure-Function?
Preoperative Diagnoses: R Knee
Degenerative Joint Disease (DJD) = arthritis
Varus malalignment = bow-leg

Procedures:
Arthroscopy & microfracture
High Tibial Osteotomy (HTO)
Packing bone graft substitute

Blocks/Medications:
Femoral n. block
General anesthesia
IV Morphine, Oral Oxycontin + Oxycodone,
Tylenol, Injectable Lovenox (enoxaparin Na)

William Sterett, MD
Ben Hogan, PAC
Vail Summit Orthopedics
R knee medial meniscus cleavage & tear
R knee lateral compartment in good shape!
1. Arthroscopy clean-up
2. Debridement complete
3. Microfracture with awl
4. Punctuate bleeding
Further bleeding to create superclot!
High-Tibial Osteotomy (HTO) to Realign the Joint

1. Oscillating saw cut
2. R plate/scaffolding insert
3. Align, stabilize w/screws & pack defect
Post-Operative Reality: 10 d injectable anti-coagulant, 3 wk oral anti-coagulant, 4 wk CPM machine, non-wt bearing 8 wk, 12 wk PT, 3-5 d/wk,...
Break for discussion/questions!
Body Levels of Organization

1. Molecular
2. Cellular
3. Tissue
4. Organ
5. System

Entire Organism, like you & me!
Nerve conducts

Muscle contracts

Connective connects!!

Epithelial covers
Epithelial tissue gives rise to glands: (a) exocrine & (b) endocrine

(a) Exocrine gland

(b) Endocrine gland
Epithelial tissue in frog skin developing into an exocrine gland!
Organs are made up ≥ 2 tissue types

**Organs**
- Body structure that integrates different tissues and carries out a specific function

**Tissue Types**
- **Epithelial tissue**
  - Protection, secretion, absorption
- **Connective tissue**
  - Structural support
- **Muscle tissue**
  - Movement
- **Nervous tissue**
  - Communication, coordination, control

![Diagram](https://via.placeholder.com/150)
Which body systems?
Which body systems?
Why study human physiology?
KNOWLEDGE IS POWER!!!

Thomas Hobbes of Malmesbury
English Philosopher, 1658
Homeostasis is essential for cell survival!

Body systems

Maintain

Homeostasis

Make up

Is essential for survival of

Cells
Maintenance of a relative constancy in the Internal environment = ECF = fluid outside of cells

milieu interieur?

100 trillion cells working intimately

Claude Bernard

Walter B. Cannon
Where is extracellular fluid?
Where is extracellular fluid?

As long as between/outside cells, ECF everywhere?

G&H 2011
ICF = Intracellular

ECF = Extracellular

Plasma (within CV System)

Interstitium (eg, between muscle cells)
HOMEOKINESIS?
Dr. Evonuk’s 6 Balances

Metabolic

$\text{H}_2\text{O}$

$\text{pH}$

$T^\circ \text{C}$

$\text{O}_2/\text{CO}_2$

Ion$^+/-$

pH
$I$  

$R$  

$C$  

$O$  

$E$  

$Ef$  

Feedback loop