ANP 213: Human Anatomy and Physiology 1

Instructor: Joel Dahms

Introductions
- Note cards
- Name
- Year you graduated HS and where
- Career goal
- List of classes you have taken that may help prepare you for ANP 213 and WHEN you took them (e.g. BIO 101, Autumn '05)
- List any other relevant experience you've had (job, internship, taking care of relatives, etc.).
- Preferred email address

Syllabus highlights - Day
- Class meets:
  - M 1:00PM - 2:50PM in AS 1520 (lecture)
  - W 1:00PM - 1:50PM in AS 1520 (lecture)
  - T/Th 1:00PM - 2:50PM in AS 1615 (lab)
- M and W are lecture
- T and Th are lab

Syllabus highlights – p.m.
- Class meets:
  - T/Th 6:00PM - 7:40PM in AS 1521 (lecture)
  - T/Th 7:50PM - 9:30PM in AS 1615 (lab)
- Every class period we will have lecture, then lab.

Contact info
- Email: jdahms@sccd.ctc.edu
  - Email is the best way to contact me
- Office: IB 2324C
- Office hours: T 4:00 - 6:00 or by appointment
- Office Phone: 985.3940 Mailbox 1 (Voice mail only)

Course website
- Course Website:
  - https://frontpage.northseattle.edu/anp213jd/
- User ID: anp213jd
- Password: neuron
Course website

The website has:
- Syllabus
- Lecture notes
- Answer keys to tests and quizzes (not yet though)
- Objectives (learning goals) for each unit
- Resources to help you study

Required texts:


Optional texts:


Grading

Breakdown:
- Exams 400 points
- Lab Practicals 200 points
- Laboratory Exercises 200 points
- Quizzes & Assignments 100 points
Total 900 points

Points

Exams: (5) = 400 points
Lab Practicals (4 x 50pts) = 200 points
Lab Exercises (20 x 10pts) = 200 points
Quizzes & Assigns = 100 points
Total = 900 points

Your grade = points you earn
900 points
Grade percentages

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Commitment

- This is a very difficult class that requires learning what is essentially a new language
- As a prerequisite, the class is designed by the college as an overview: lots of breadth, little depth
- Expect 20+ hours of reading and studying each week in addition to class sessions
- The pace is a little frantic so missing class is not recommended.

Exams - Day:

Five exams
- Wed 4/9: Exam 1 (Chaps 1 - 3)
- Wed 4/23: Exam 2 (Chaps 4, 5)
- Wed 5/7: Exam 3 (Chaps 6, 7)
- Wed 5/21: Exam 4 (Chaps 8 - 10)
- Wed 6/11: Exam 5 (Chaps 11 - 15)
  - 1 - 3pm

Exams - p.m.:

Five exams
- Thurs 4/10: Exam 1 (Chaps 1 - 3)
- Thurs 4/24: Exam 2 (Chaps 4, 5)
- Thurs 5/8: Exam 3 (Chaps 6, 7)
- Thurs 5/22: Exam 4 (Chaps 8 - 10)
- Thurs 6/12: Exam 5 (Chaps 11 - 15)
  - 6 - 8pm

Exams

- Given in lecture
- First 4 = 75 points each
- Final = 100 points
- 1 hour+
- Final (Exam 5):
  - NOT cumulative
  - 2 hours (1- 3pm)
  - On Wed of finals week

Exams

- A little more than half objective questions: multiple-choice, matching, true/false
- The rest: fill-in-the-blank, short answer, short essay, and diagram labeling
- You will need a Scantron form and a #2 pencil for each exam.
- Not cumulative per se
Exams
- Exams may not be rescheduled or made-up due to tardiness or absence. Students with extraordinary circumstances should discuss them with the instructor as soon as the situation occurs.
- If you know ahead of time that you will miss an exam for a valid reason, we can make arrangements but let me know as far ahead of time as possible.

Lab Practical Exams
- Thurs 5/1  Practical 1: Histology
- Thurs 5/15 Practical 2: Bones
- Thurs 5/31 Practical 3: Muscles
- Tues 6/10 Practical 4: Nervous

Lab Practical Exams
- Four of these, worth 50 points each
- Cover the material on the “Lab Practical Study Guide”
- Given in the lab, they will involve slides, projected pictures of slides, bones, muscle models, brain models, and diagrams.

Objectives
- List of learning goals that need to be achieved for you to do well in this class
- Contains what the I and others have deemed to be the most important things for you to know to go on in a health-related career.
- Available on the course website.

Lectures
- Lecture slides available on course website before lecture (all are posted now)
- Do not cover ALL the material on exams (but the vast majority comes from the lectures)
- “Objectives” for each unit will be posted on the website at the beginning of each unit. These are a general idea of what you should know for the exams.

Attendance
- Students should attend every class session. If you miss a class session, it is your responsibility to obtain the lecture notes, to make up laboratory experiments and to obtain handouts, assignments or other materials distributed in class. ESPECIALLY because we meet only twice a week (for p.m. class)
Quizzes
- There will be three quizzes, the first two quizzes in the first three weeks of class
- Quizzes may cover material presented in lab or lecture
- Designed to prepare you for the types of questions on the exam (multiple choice, T/F, fill-in-the-blank, short answer).
- **QUIZ 1 will be on Wed (Thurs for p.m. class)**—on material covered this week in chapters 1 and 2.

Labs
- Many laboratory exercises must be completed in the laboratory. Students who miss a laboratory exercise **must schedule** a make-up session with me or come in during open lab time to get credit for that exercise.
- Lab exercises will be due the following week in lab.

Schedule of Lectures and Readings (Approximate)

Questions?

Introduction to the Human Body

Anatomy
- “tome” means to cut in Greek
- Describes the **structures** of the body:
  - what they are made of
  - where they are located
  - associated structures
**Physiology**

- Is the study of:
  - functions of anatomical structures
  - individual and cooperative functions

**KEY CONCEPT**

- All physiological functions are performed by specific anatomical structures
- Principle of complementarity says that structure and function are complementary
  - Function always reflects structure
  - What a structure can do depends on its specific form

**Introduction**

- Key to learning anatomy is understanding function
  - For example:
    - Left side of heart is larger than right.
  - Why is that?

Structure (anatomy) and function (physiology) are intimately related

**Gross Anatomy**

- Structures large enough that one can see with the unaided eye
  - Surface Anatomy - study of superficial markings
  - Regional Anatomy - The study of specific areas of the body (e.g. head, trunk)
  - Systemic Anatomy - Study of the 11* specific organ systems

**11 Organ systems**

- Integumentary*
- Nervous*
- Skeletal*
- Endocrine
- Muscular*
- Cardiovascular
- Lymphatic
- Urinary
- Respiratory
- Reproductive
- Digestive
Microscopic Anatomy
- Cf. Gross anatomy
- Involves studying anatomical structures that cannot be seen with the unaided eye
  1. Cytology - cells
  2. Histology - tissue

Physiology = Function
- Considers the operation of specific organ systems
  - Renal – kidney function
  - Neurophysiology – workings of the nervous system
  - Cardiovascular – operation of the heart and blood vessels
- Focuses on the functions of the body, often at the cellular or molecular level

Anatomical Organization
- We will start from the smallest and finish with the largest

Levels of Organization
- Chemical Level: atoms (e.g. carbon) combine to form molecules (e.g. glucose)
- Cellular level:
  - Smallest living units in organisms
  - Cells contain organelles, each with a function
- Tissue level - different groups of cells that perform a function
- Organ Level - Different types of tissues that perform a common function
- Organ system – consists of different organs that work closely together

Levels of Structural Organization

Figure 1.1
Other Levels

- Organismal Level - All systems working together (e.g. humans)
- Ecological level - How organisms interact with each other and their environment

KEY CONCEPT

- The body is divided into 11 organ systems
- All organ systems work together → Integration

Homeostasis

- Homeostasis: ability to maintain a relatively stable internal environment in an ever-changing outside world
- All body systems working together to maintain a stable internal environment, respond to external and internal changes to function within a normal range (body temperature, fluid balance)
- The internal environment of the body is in a dynamic state of equilibrium
- Failure to function within a normal range results in disease

Homeostatic Control Mechanisms

- Variables produce a change in the body
- The three interdependent components of control mechanisms:
  - Receptor – monitors the environments and responds to changes (stimuli)
  - Control center – determines the set point at which the variable is maintained
  - Effector – provides the means to respond to stimuli

Homeostatic Control Mechanisms

- Variables produce a change in variable
- Change detected by receptor
- Information sent along afferent pathway to
  - Receptor (sensor) → Effector
  - Control center
- Information sent along efferent pathway to
  - Receptor
  - Effector
- Response of effector leads back to afferent pathway of variable
- Imbalance

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**Regulation**
- Extrinsic regulation:
  - responses controlled by nervous and endocrine systems
  - E.g. brain regulates body temp
- Usually occurs by negative feedback which can be modeled as a thermostat

**Negative Feedback**
- Most common way that homeostasis is maintained in the body
- In negative feedback systems the response of the effector *negates* or opposes the stimulus (shuts off the original stimulus)
- Example: Regulation of room temperature

**Negative Feedback**
- Rare in nature
- The response of the effector output *reinforces or exaggerates* the stimulus (e.g. blood clotting, ovulation, action potential)
- NOT a way to maintain homeostasis
Homeostatic Imbalance

- Disturbance of homeostasis or the body’s normal equilibrium
- Overwhelming the usual negative feedback mechanisms allows destructive positive feedback mechanisms to take over

Anatomical Position

- Hands at sides, palms forward

Directional Terms

- Superior and inferior – toward and away from the head, respectively
- Anterior and posterior – toward the front and back of the body
- Medial, lateral, and intermediate – toward the midline, away from the midline, and between a more medial and lateral structure
- Proximal and distal – closer to and farther from the origin of the body part
- Superficial and deep – toward and away from the body surface

Orientation of terms

- Note that Left/Right are reversed in anatomical figures
- WHY?

Alternate Terms

- Ventral (= Anterior)
- Dorsal (= Posterior)
- Cranial – head
- Caudal – tail
Body Planes
- Sometimes to gain a greater understanding of 3D images anatomists cut the image at different planes
- Three planes exists in 3D space
  - Two are parallel to the long axis of the body
  - One is perpendicular to the long axis.

Body Planes
- **Sagittal** – parallel to long axis, divides the body into right and left parts
  - midsagittal or medial – sagittal plane that lies on the midline
- **Frontal** or **coronal** – also parallel to long axis, divides the body into anterior and posterior parts
- **Transverse** or **horizontal** (cross section) – perpendicular to long axis, divides the body into superior and inferior parts

Body Cavities
- **Dorsal cavity** protects the nervous system, and is divided into two subdivisions
  - Cranial cavity – within the skull; encases the brain
  - Vertebral cavity – runs within the vertebral column; encases the spinal cord
- **Ventral cavity** houses the internal organs (viscera), and is divided into two subdivisions
  - Thoracic
  - Abdominopelvic

Anatomical Variability
- Humans vary slightly in both external and internal anatomy
- Over 90% of all anatomical structures match textbook descriptions, but:
  - Nerves or blood vessels may be somewhat out of place
  - Small muscles may be missing
  - Extreme anatomical variations are seldom seen
Body Cavities

Figure 1.9a

Cranial cavity (contains brain)

Dorsal body cavity

Diaphragm

Abdominal cavity (contains digestive viscera)

Pelvic cavity (contains bladder, reproductive organs, and rectum)

Vertebral cavity (contains spinal cord)

Key:

Dorsal body cavity

Ventral body cavity

(a) Lateral view

Figure 1.9b

Cranial cavity

Thoracic cavity (contains heart and lungs)

Diaphragm

Abdominal cavity (contains digestive viscera)

Pelvic cavity (contains bladder, reproductive organs, and rectum)

Vertebral cavity

Key:

Dorsal body cavity

Ventral body cavity

(b) Anterior view

Figure 1.10a

Ventral Body Cavity

A. Thoracic Cavity
   - Pleural Cavity
   - Pericardial Cavity

B. Abdominopelvic (peritoneal) Cavity
   1. Abdominal cavity
   2. Pelvic cavity

Figure 1.10b

Ventral Body Cavity Membranes

- Parietal serosa lines internal body walls
- Visceral serosa covers the internal organs
- Serous fluid separates the serosae

Serous Membrane Relationship

(a) Outer balloon wall (comparable to parietal serosa)
   Air (comparable to serous cavity)
   Inner balloon wall (comparable to visceral serosa)

(b) Parietal pericardium
   Pericardial space with serous fluid
   Visceral pericardium

Heart Serosae

Figure 1.10b
SUMMARY

- Structure and function in anatomy and physiology
- Levels of physical organization
- Homeostasis and feedback
- Systems integration and equilibrium
- Anatomical terms
- Locations and functions of major cavities
- Serosa