

# **HUMAN ANATOMY AND PHYSIOLOGY**

**SCB-204**

La Guardia Community College  
City University of New York  
Department of Natural Sciences  
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A & P Coordinator

## Policy on Academic Integrity.

Human Anatomy and Physiology (SCB-203, SCB-204) will be conducted in compliance with La Guardia Community College's Academic Integrity Policy regarding cheating on examinations and quizzes.

If a student is suspected of academic misconduct or dishonesty (such as cheating, bribery or plagiarism) the instructor will complete the academic integrity complaint form. The following steps will then subsequently occur:

- The faculty member meets with the student charged with the violation; shows him/her the completed Complaint Form, which indicates the faculty member's sanction (either an "F" on the paper, quiz or exam involved: or an "F" in the course). The instructor asks the student to check one of the three options printed on the form. The student may select "I do not challenge the accusation and accept the sanctions" or "I challenge the accusation and wish for the matter to be referred to the Chief Adjudicator for further review" or "I do not wish to make any statement at this time and I am aware that the sanction will be upheld without further review for appeal after fifteen days of receipt of this notice".
- The form, with the evidence attached, is then signed by the student and by the faculty member and sent to the Chairperson of the department. The student should be advised that signing of the document is not considered an admission of guilt but only an understanding of the allegations and the possible sanctions filed against them.
- A copy of the form is given to the student and the faculty member retains a copy for his/her files.
- The Chairperson determines whether the matter has been resolved or not; checks the appropriate line on the complaint form; signs the form; files a copy, together with copies of the supporting evidence in the department's files; and sends a copy with the supporting evidence to the Academic Integrity Officer (AIO) in C-317.
- If the alleged violation is discovered after the class has met for the final time in the semester, the instructor notifies the student by e-mail and certified postal mail, requesting a meeting. If the student does not respond, that is so noted on the complaint form and the form with supporting documentation is sent to the department Chairperson, who also attempts to contact the student. If the student does not respond, the form and documents, including documentation of the attempts to contact the student are sent to the AIO.
- If the student checks, "I do not wish to make any statement at this time," or if the student refuses to sign the form at all, or if the student refuses to meet with the professor, the complaint form and attached documents are filed in the department and are sent to the AIO, who calls the student to a meeting and then determines an appropriate course of action, as described above. In cases in which the student fails to appear at the required meeting within one week of notification, the faculty sanction shall apply without benefit of student appeal.
- The AIO functions in these processes as the representative of the Vice President of the Division of Student Affairs. The AIO promptly notifies the Chairperson of receipt of the complaint form, of the determination made by either the Academic Standing Committee or the Student-Faculty Disciplinary Committee and of the inclusion of the student's name in the division's data base of students who admit violations or who are determined to be guilty of violations. The AIO will review the data base to identify repeat offenders and to impose appropriate disciplinary sanctions.
- Finally, when the faculty sanction allows the student to complete work necessary for passing the course, the student is allowed to do so. When the faculty sanction is failure for the course and the student requests a hearing or chooses not to make a statement, the student remains in the course until the matter is resolved. If the matter is not resolved by the end of the term, the professor gives the student a grade that incorporates the proposed sanction, with the possibility of revision when the matter is resolved.

## Grading Procedures and Criteria for Human Anatomy and Physiology

The final grade in SCB-203 and SCB-204 is determined by the sum of the lecture and laboratory portions of the course. The lecture composes 60% and the laboratory 40% of the final grade, respectively.

Lecture Exams	% of the Final Grade	Laboratory Exams	% of the Final Grade
6 Lecture Quizzes*	30%	2 Practical Exams	20%
2 Lecture Exams	<u>30%</u>	2 Written Exams <sup>#</sup>	<u>20%</u>
	60%		40%

\*The lowest quiz is dropped. <sup>#</sup>The laboratory final in SCB-203 also has a practical portion worth 40% of the grade. There is also a ten point clay modeling grade in SCB-203.

Practical exams are based on the identification of laboratory materials displayed at stations. Written exams may include short answers, fill-ins, diagrams and essays. Attendance is mandatory for all labs. It is the student's responsibility to make-up missed labs. There are no make-ups for laboratory practical exams and the student must take the exam the week it is offered during the semester.

### Final Grades

92.5-100 = A	86.5-89.4 = B+	76.5-79.4 = C+	66.5-69.4 = D+	0-59.4 = F
89.5-92.4 = A-	82.5-86.4 = B	72.5-76.4 = C	62.5-66.4 = D	
	79.5-82.4 = B-	69.5-72.4 = C-	59.5-62.4 = D-	

### SCB-204 Information Sheet

Note that there is a strict **no food, no drink, no smoking and no open toed shoe policy** in the laboratory. Students who fail to comply with these rules may not participate in the laboratory.

Attendance is a requirement for this class. Instructors are required to keep official records of attendance. The maximum number of unexcused absences is limited to 15% of the total number of class hours. Absences are counted from the first day of class even if they are a result of late registration or change of program.

Classes will meet in accordance to the Academic Calendar which may be obtained from the College's web site. Classes may not be cancelled due to inclement weather. Check for announcements on the college's website or CUNYfirst.

Refer to the College Handbook for the rights and responsibilities of students found on the college's web site.

The Grading Policy for these courses is noted above. Repeat, "R", grades are not given in this course and Incompletes, "IN", are issued only under very restricted circumstances. In order to receive an Incomplete, a student must be passing the course and be able to document why he/she is unable to complete the course work during the semester. Both the student and the instructor must complete and sign an Incomplete Form and list the exams that must be completed before a grade is issued. Students have six months to complete the missing exams; otherwise the incomplete is automatically converted to an F grade. An Incomplete does not provide a student with an opportunity to retake exams. All prior grades are retained and added into the calculation of the final grade. Note that the process for an incomplete must be initiated by the student.

## SCB-204: HUMAN ANATOMY AND PHYSIOLOGY II

### Lecture Syllabus

Open Stax ebook (Free) <https://openstax.org/details/books/anatomy-and-physiology>

Text: Human Anatomy & Physiology, Second Edition by Erin C. Ammerman ebook

Pearson <https://www.pearson.com/store/p/human-anatomy-physiology/P100000739620>

Lec	Lecture Topic	Readings in Amerman	Units in Open Stax
1	Organization and Histology of the Nervous System	Ch. 4 (148-150), Ch. 11 (381-393), Ch 13 (475-479)	12.1, 12.2
2	Neuronal Function	Ch. 11 (393-403)	12.3, 12.4, 12.5
3	Synaptic Transmission	Ch. 11 (403-409, 411-416)	12.5
4	Neurotransmitters and Neuronal Circuits	Ch. 11 (411-418)	12.5
5	<b>LECTURE QUIZ 1; CNS – The Spinal Cord</b>	Ch. 12 (455-459) Ch. 13 (488-496, 502)	13.2
6	Reflexes	Ch. 13 (506-511)	13.4, 13.2, 13.3
7	CNS – Brain Organization and Function	Ch. 12 (422-432, 441-454)	13.2, 13.3
8	Brain Function and the Cranial Nerves	Ch. 12 (432-441) Ch. 13 (479-487)	13.2, 13.4
9	Neural Integration of the CNS	Ch. 12 (459-469), Ch. 13 (504-505)	12.5
10	<b>LECTURE QUIZ 2; The Autonomic Nervous System</b>	Ch. 14 (516-533) Ch. 22 (855)	15.1, 15.2, 15.3, 15.4
11	Disorders of the Nervous System	Ch. 11-13 and page 45, 93	12.2, 13.3
12	Cutaneous Perception	Ch. 5 (167-169), Ch. 13 (497-501)	14.1
13	Introduction to Special Senses and Vision	Ch. 15 (536-537, 544-562)	14.1
14	Hearing and Equilibrium	Ch. 15 (562-578)	14.1
15	Olfaction and Gustation	Ch. 15 (537-543, 578-579)	14.1
16	<b>LECTURE QUIZ 3; Hormonal Regulation</b>	Ch. 16 (584-592)	17.1, 17.2
17	Hypothalamus, Pituitary and Adrenal Glands	Ch. 16 (593-601, 608-614)	17.3, 17.6
18	Thyroid, Parathyroid, Pancreas and Other Glands	Ch. 16 (601-608, 614-625)	17.4, 17.5, 17.9
19	<b>LECTURE MIDTERM EXAM</b>	<b>Lectures 1-18</b>	<b>Lectures 1-18</b>
20	The Alimentary Canal and Accessory Organs	Ch. 22 (851-863, 879-886)	23.1
21	Deglutition and Gastrointestinal Structure	Ch. 22 (863-868, 872-873)	23.2, 23.3
22	Enzymatic Digestion and Absorption	Ch. 22 (868-871, 874-875, 886-896)	23.4, 23.5, 23.7
23	The Large Intestine and the Hepatic Portal System	Ch. 22. (875-877) and 709-709, Ch. 18 (709-710)	23.5, 23.6
24	Neural and Hormonal Control of Digestion and Disorders	Ch. 22 (855, 877-879, 874-875), Ch.22	24.1
25	<b>LECTURE QUIZ 4; Nutrition</b>	Ch. 23 (902-906, 920-928, 932-946)	24.7, 24.5, 24.6
26	Carbohydrate Metabolism	Ch. 23 (907-916)	24.2
27	Lipid and Protein Metabolism	Ch. 23 (916-920)	24.3, 24.4
28	Gross Anatomy of the Urinary System	Ch. 24 (947-952, 984-986)	25
29	Histology and Physiology of the Urinary System	Ch. 24 (952-966)	25
30	Physiology of the Urinary System and Homeostasis	Ch. 24 (967-984) Ch. 25 (998-1012)	25
31	Biochemistry and Pathology of the Urinary System	Ch. 24 (983-989) and Ch. 24	25
32	<b>LECTURE QUIZ 5; The Male Reproductive System</b>	Ch. 26 (1022-1023 1027-1039)	27.1
33	The Female Reproductive System	Ch. 26 (1039-1050)	27.2
34	Menstruation and Fertilization	Ch. 26 (1050-1061. 1068-1075)	28.1
35	Embryology, Parturition and Lactation	Ch. 27 (1066-1068, 1076-1093)	28.2, 28.3, 28.4, 28.5, 28.6
36	<b>LECTURE QUIZ 6; Heredity</b>	Ch. 27 (1093-1098)	28.7
	<b>LECTURE FINAL EXAM (During Finals Week)</b>	<b>Lectures 20-36</b>	<b>Lectures 20-36</b>

## SCB-204 – HUMAN ANATOMY AND PHYSIOLOGY II

### OUTLINE OF THE LECTURE OBJECTIVES

#### **Lecture 1.** Histology and Organization of the Nervous System.

- a. Describe the function of the nervous system in maintaining homeostasis
- b. Classify the nervous systems into central, peripheral and enteric divisions.
- c. Identify the different parts of a typical neuron and categorize neurons according to structure and function.
- d. Describe the characteristics and functions of neuroglia.
- e. Describe how myelination occurs in the CNS and PNS and explain its importance in signal transmission; nerve regeneration.
- f. Distinguish between nerve, tract, ganglion and nucleus.

#### **Lecture 2.** Neuronal Function.

- a. Review membrane channels: leak and (mechanically, ligand and voltage) gated channels.
- b. Define resting membrane potential and describe its electrochemical basis.
- c. Compare and contrast local and action potentials.
- d. Explain how action potentials are generated and propagated along neurons.
- e. Define saltatory conduction and compare it to conduction along unmyelinated fibers. Include fiber diameter as a factor affecting conduction speed.
- f. Describe how changes in extracellular calcium ions or potassium ions can disrupt neural function.

#### **Lecture 3.** Synaptic Transmission.

- a. List the chemical and electrical events involved in synaptic conduction.
- b. Identify the mechanisms for the removal neurotransmitters from the synaptic cleft to end transmission.
- c. Distinguish between excitatory and inhibitory postsynaptic potentials and explain facilitation.
- d. Contrast convergence and divergence and how they relate to temporal and spatial summation.

#### **Lecture 4.** Functional Groups of Neurons

- a. Categorize neurotransmitters according to chemical structure, receptors and distribution in the CNS and PNS.
- b. Categorize neurotransmitter effects on membrane potential (inhibitory or excitatory) and mechanism of action (ionotropic or metabotropic).
- c. Explain how neuromodulators affect synaptic transmission; define synaptic potentiation.
- d. Describe how sensory pathways diverge and motor pathways converge.

#### **Lecture 5.** CNS – Spinal Cord Organization and Function.

- a. **LECTURE QUIZ 1 (Lectures 1-4).**
- b. Define the spinal cord as the inferior extension of the brain.
- c. Describe the principal structural features of the spinal cord and the locations of the sensory, motor, and visceral nuclei.
- d. Describe the structure of a typical spinal nerve.

- e. Define a plexus.
- f. List the name, composition, and functions of the principal plexuses.
- g. Describe the segmental innervations of the body and their clinical significance; define dermatomes.
- h. Describe the functions of the spinal cord. Compare and contrast the functions of the ascending and descending tracts; explain decussation.

#### **Lecture 6. Reflexes.**

- a. Define a reflex and list the components and functions of a reflex arc.
- b. Distinguish between a spinal and cranial reflex; somatic and visceral (autonomic) reflex.
- c. Compare a stretch reflex with a flexor (withdrawal) reflex as examples of mono and polysynaptic reflexes. Describe the crossed extensor reflex.
- d. Define: contralateral, ipsilateral and reciprocal inhibition.
- e. Explain how reflexes are important to motor coordination and list four properties of a reflex.

#### **Lecture 7. CNS – Brain Organization and Function.**

- a. Identify the three principal parts of the brain (cerebrum, cerebellum, and brainstem); identify the diencephalon, midbrain, pons and medulla oblongata.
- b. Describe the protective structures of the brain and spinal cord (meninges, bones, CSF and the blood-brain barrier).
- c. Trace the formation and circulation of the CSF.
- d. Explain the distribution of grey and white matter in the brain and how it differs in the spinal cord.
- e. List the major lobes, fissures, sulci, gyri and functional areas of the cerebral cortex and explain the lateralization of the cerebral hemispheres.
- f. Locate and explain the functions of the motor, association, sensory and limbic areas of the cerebrum.

#### **Lecture 8. Brain Functions and the Cranial Nerves.**

- a. Describe the location and the functions of the diencephalon.
- b. Identify the anatomical characteristics and functions of the cerebellum.
- c. Describe the structure and functions of the pons, midbrain and medulla.
- d. Explain the importance of the reticular activating system and basal nuclei.
- e. Differentiate between commissures, association, and projection fibers.
- f. Identify by number, name, origin, distribution and function of the twelve pairs of cranial nerves.

#### **Lecture 9. Neural Integration of the CNS.**

- a. Describe the organization of the sensory and motor pathways.
- b. Differentiate between pathways and tracts; first, second and third order sensory neurons and upper and lower motor neurons.
- c. Explain the sensory and motor homunculi.
- d. Explain referred and phantom pain.

#### **Lecture 10. The Autonomic Nervous System.**

- a. **LECTURE QUIZ 2 (Lectures 5-9).**

- b. Compare and contrast the structural and functional differences between the somatic, autonomic and enteric divisions of the peripheral nervous system.
- c. Identify the structural features of the autonomic nervous system and how it functions as reflex pathways.
- d. Compare and contrast the sympathetic and parasympathetic divisions of the autonomic nervous system; discuss dual innervation.
- e. List the preganglionic and postganglionic neurotransmitters released by sympathetic and parasympathetic neurons .
- f. Describe the cholinergic and adrenergic receptors on target cells.
- g. Discuss the relationship of the autonomic nervous system with the enteric nervous system.

**Lecture 11. Disorders of the Nervous System.**

- a. List the clinical symptoms of multiple sclerosis, meningitis, sciatica, spinal cord trauma, spina bifida, Tay-Sacs, Alzheimer's, Huntington's and Parkinson's diseases.
- b. Define the medical terminology associated with the nervous system.
- c. Describe the actions and effects of various drugs on nervous function.

**Lecture 12. Cutaneous Perception.**

- a. List the general properties of sensory receptors.
- b. Compare the location and function of exteroceptors, interoceptors and proprioceptors.
- c. List the location and function of the receptors for touch, pressure, temperature, pain and proprioception.
- d. Define sensory adaptation, generator potential, label-line code, receptive field, sensation and perception.

**Lecture 13. Vision.**

- a. Describe the structure and functions of the accessory structures of the eye.
- b. Describe the histology and gross anatomy of the eye.
- c. Describe retinal image formation including refraction, accommodation, constriction of the pupil, convergence and inverted image.
- d. Define emmetropia, myopia, hypermetropia, presbyopia and astigmatism.
- e. Compare and contrast the function of rods and cones.
- f. Describe the physiology of vision and light transduction.
- g. Describe the afferent pathway of impulses from the eye to the brain.

**Lecture 14. Hearing and Equilibrium.**

- a. Define the anatomical subdivisions of the ear and describe their structure and functions.
- b. Describe the principal events involved in the physiology of hearing.
- c. Identify the receptor organs and their neural pathways for equilibrium.
- d. Describe the maintenance of dynamic and static equilibrium.
- e. Explain how rotational movements, gravity and acceleration affect the equilibrium apparatus.
- f. Describe conductive and sensory deafness.

**Lecture 15. Olfaction and Gustation.**

- a. Locate the receptors and describe the neural pathway for olfaction.
- b. Describe the physiological process to discriminate different odors.

- c. Identify the receptors and describe the neural pathway for gustation.
- d. Describe the physiology of taste and the basic taste sensations.
- e. Discuss the interaction of olfaction and gustation in taste perception.

**Lecture 16. Hormonal Regulation.**

- a. **LECTURE QUIZ 3 (Lectures 10-15).**
- b. Discuss the function of the endocrine system as a body control system and compare it to the nervous system.
- c. Review the differences between endocrine and exocrine glands.
- d. Identify the relationship between an endocrine gland and its target organ.
- e. Define the term hormone and discuss hormone chemistry with regard to first and second messenger activation.
- f. Review with examples negative and positive feedback mechanisms.

**Lecture 17. The Hypothalamus, Pituitary and Adrenal Glands.**

- a. Define the anatomical and physiological relationship between the pituitary gland and the hypothalamus.
- b. List the seven hormones of the adenohypophysis, their target organs and functions.
- c. Define the source of hormones stored by the neurohypophysis, their target organs, and functions.
- d. Relate a negative feedback mechanism to the regulation of hormones secreted by the pituitary.
- e. Describe adrenal gland histology and the medullary secretions as supplements to sympathetic stimulation.
- f. List hormones produced by the adrenal gland and list their physiological effects.
- g. Compare the effects of hypo and hypersecretions of adrenal hormones.
- h. Define the general stress syndrome and compare homeostatic and stress responses.

**Lecture 18. The Pancreas and other Endocrine Glands.**

- a. Describe how thyroxin is synthesized, stored, and transported by thyroid follicles.
- b. Identify the physiological effects and regulation of thyroxin and calcitonin.
- c. Describe the physiological effects and regulation of parathyroid hormone.
- d. Describe the structure of the islets of Langerhans in the pancreas.
- e. Compare the roles of glucagon and insulin in the control of blood sugar levels.
- f. Identify the physiological effects of the hormones secreted by the pineal gland.

**Lecture 19. MIDTERM EXAM (Lectures 1-18).**

**Lecture 20. The Alimentary Canal and Accessory Organs.**

- a. Identify the organs of the alimentary canal and the accessory organs of digestion.
- b. Describe the histology of the alimentary canal.
- c. Discuss the location and function of the peritoneum.
- d. Describe the role of the mouth in mechanical digestion.
- e. Identify the location of the salivary glands.
- f. Define the function of saliva during digestion.
- g. Describe the mechanisms that regulate the secretion of saliva.
- h. Compare deciduous and permanent teeth.



## **Lecture 21.** Deglutition and Gastrointestinal Structure.

- a. Describe the sequence of events involved in swallowing.
- b. Describe the mechanisms by which food is moved along the alimentary canal and the protective action of mucus.
- c. Describe the structural features of the stomach and the relationship between these features and digestion.
- d. Describe the structural features of the small intestine adapted for digestion.
- e. Discuss the motility of the stomach and small intestine.
- f. Trace the duct system from the accessory organs to the duodenum.
- g. Describe the digestive functions of the pancreas.
- h. List the major functions of the liver and gall bladder.

## **Lecture 22.** Enzymatic Digestion and Absorption.

- a. Describe the sequential enzymatic digestion of carbohydrates, lipids and proteins; be able to name the enzymes, organs and intermediate and final end products as food passes through the alimentary canal.
- b. Describe in detail with illustrations the villi structure of the small intestine.
- c. Explain the absorption of carbohydrates, proteins and lipids in the small intestine.
- d. Explain the absorption of vitamins, water and electrolytes in the small intestine.
- e. Compare and contrast the fates of the absorbed nutrients.

## **Lecture 23.** The large Intestine and the Hepatic Portal System.

- a. Describe the mechanisms by which the liver can convert, release or store amino acids, fatty acids and monosaccharides.
- b. Describe the structural features of the large intestine that adapt it for feces formation, elimination and vitamin production.
- c. Describe the mechanical movements of the large intestine.
- d. Describe the processes involved in feces formation.
- e. Describe the mechanisms involved in defecation.

## **Lecture 24.** Neural and Hormonal Control of Digestion.

- a. Describe the mechanics involved in the cephalic, gastric and intestinal phases of gastric activity. Name the actions that inhibit gastric secretion and motility.
- b. Describe the role of the enteric nervous system in regulating digestion.
- c. Discuss the regulation of the pancreatic and hepatic secretions to the duodenum.
- d. Describe the mechanisms involved in the hormonal control of digestion in the stomach and small intestine.
- e. Describe the major disorders of the digestive system.

## **Lecture 25.** Nutrition.

- a. **LECTURE QUIZ 4 (Lectures 20-24).**
- b. Define the terms nutrient and calorie and describe their relationship to metabolism.
- c. Define metabolism and contrast between the physiological effects of catabolism and anabolism.
- d. Define basal metabolic rate and list factors that affect it.
- e. Explain what is meant by an essential amino acid and fatty acid and their major sources.

- f. Define a mineral. List the major minerals and their functions.
- g. Differentiate between fat and water-soluble vitamins; discuss the antioxidant benefit of some vitamins; list and describe the importance of the vitamins in each group.
- h. Contrast the physiological factors involved in starvation and obesity.

**Lecture 26. Carbohydrate Metabolism.**

- a. Compare the types and sources of carbohydrates.
- b. Describe the fate of glucose as it is catabolized via glycolysis; the Krebs cycle and the electron transport chain.
- c. Compare anaerobic and aerobic respiration.
- d. Define glycogenesis as an example of carbohydrate anabolism.
- e. Define glycogenolysis as an example of carbohydrate catabolism.
- f. Define gluconeogenesis as a conversion of non-carbohydrate sources into glucose.

**Lecture 27. Lipid and Protein Metabolism.**

- a. Compare the types and sources of lipids.
- b. Explain the catabolism and anabolism of lipids; include beta oxidation.
- c. Discuss dietary sources of protein.
- d. Provide examples of protein anabolism.
- e. Discuss protein catabolism and deamination.

**Lecture 28. Gross Anatomy of Urinary System.**

- a. List the functions and an anatomical overview of the urinary system.
- b. Identify the gross anatomy of the kidney.
- c. Describe the anatomy of the nephron.
- d. Describe the blood and the nerve supply to the kidneys.
- e. Describe the structure of the ureters.
- f. Describe the structure of the urinary bladder.
- g. Describe the structure of the urethra.

**Lecture 29. Histology and Physiology of Urinary System.**

- a. Describe the process of urine formation.
- b. Define glomerular filtration, tubular reabsorption, and tubular secretion.
- c. Define the chemical composition of plasma, glomerular filtrate and urine.
- d. Define the forces that support and oppose the filtration of blood in the kidneys.
- e. Discuss renal suppression as a disorder resulting from a decreased filtration pressure.
- f. Describe the physiological role of tubular reabsorption.
- g. Describe tubular secretion as a mechanism of excretory elimination and control of blood pH.

**Lecture 30. Physiology of the Urinary System and Homeostasis.**

- a. Define kidney excretion of  $H^+$  and  $NH_4^+$  as a means of maintaining the pH of the body while conserving bicarbonate.
- b. Describe the effects of blood pressure, diet, temperature, and age on urine production.
- c. Describe the physiology of micturition.
- d. Compare the cause of incontinence and urinary retention.
- e. Define renal threshold and describe how it affects urine composition.

- f. Describe how renal blood pressure influences urine output.

**Lecture 31.** Biochemistry and Pathology of the Urinary System.

- a. Describe the roles of the pituitary, hypothalamus and adrenal glands in urine formation and homeostasis.
- b. Explain the role of the kidney in erythropoiesis and blood pressure regulation.
- c. Describe the causes of ptosis, kidney stones, gout, glomerulonephritis, pyelitis, and incontinence.
- d. Describe the principle of hemodialysis.
- e. Define the medical terminology associated with the urinary system.

**Lecture 32.** The Male Reproductive System.

- a. **LECTURE QUIZ 5 (Lectures 25-31).**
- b. Describe the gross anatomy of the male reproductive system.
- c. Describe the role of the scrotum in protecting the testes.
- d. Describe how the testes produce sperm and testosterone (meiosis is discussed in lab).
- e. Describe the physiological effects of testosterone.
- f. Trace the course of sperm through the ducts that lead from the testes to the exterior.
- g. Contrast the functions of the seminal vesicles, prostate gland, and bulbourethral glands in secretion of seminal fluid.

**Lecture 33.** The Female Reproductive System.

- a. Describe the gross anatomy of the female reproductive system.
- b. Describe the ovaries as glands that produce ova and female sex hormones (meiosis is discussed in lab).
- c. Describe the physiological effects of estrogen and progesterone.
- d. Describe the uterine tubes.
- e. Identify the uterus as the organ that holds the fetus. Describe the histology, blood supply and ligaments of the uterus.
- f. Identify the functions of the vagina.
- g. List the external genitalia and their functions.
- h. Describe the structure and development of the mammary glands.

**Lecture 34.** Fertilization and Menstruation.

- a. Describe the principal events of the menstrual and ovarian cycles.
- b. Correlate the activities of both the menstrual and ovarian cycles.
- c. Describe the hormonal interactions that control the menstrual and ovarian cycles.
- d. Describe the activities associated with fertilization and implantation.
- e. Explain puberty and menopause.
- f. Discuss in vitro fertilization, embryo storage and stem cell research.

**Lecture 35.** Embryology, Parturition and Lactation.

- a. Describe early embryonic development from the zygote to the formation of the primary germ layers.
- b. List the body structures produced by each primary germ layer.
- c. Discuss the structure and function of the embryonic membranes.

- d. Describe the role of the placenta and umbilicus during embryonic and fetal growth.
- e. Describe the body changes associated with the growth of the fetus. Differentiate between a fetus and an embryo.
- f. Compare and contrast the source and function of hormones secreted during pregnancy.
- g. Describe the three stages of labor.
- h. Describe the physiology of lactation.

**Lecture 36. Inheritance.**

- a. **LECTURE QUIZ 6 (Lectures 32-35).**
- b. Review DNA as the source of genetic information.
- c. Distinguish between genotype and phenotype.
- d. Explain how phenotypes can result from allele combinations, polygene inheritance and environmental factors.
- e. Define mutation and the effects of mutations.
- f. Discuss non-traditional inheritance such as mitochondrial inheritance.
- g. Discuss amniocentesis, chorionic villus sampling and genetic counseling.
- h. Provide examples of how genetic engineering has produced new and low cost medicines that has revolutionized treatment of medical disorders.
- i. Explain the Human Genome Project and its benefits and problems.

**Scientific World**

- Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies.
- Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions.
- Articulate and evaluate the empirical evidence supporting a scientific or formal theory.
- Articulate and evaluate the impact of technologies and scientific discoveries on the contemporary world, such as issues of personal privacy, security, or ethical responsibilities.
- Understand the scientific principles underlying matters of policy or public concern in which science plays a role.