

Med 530 Course C
Foundations of Medicine: Anatomy, Physiology, and Pathology
(4 units)

Master of Science in Global Medicine
Department of Medical Education Affairs
Keck School of Medicine
University of Southern California

Instructors: Dr Jorge N. Artaza, Dr Monica G. Ferrini

USC blackboard (BB): available at <https://blackboard.usc.edu/>

– The syllabus, announcements, lecture slides, online homework assignments, and grades will be posted on BB.

Required Textbooks:

Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn. Publisher: Pearson; ISBN: 0-8053-9591-1.

PhysioEx 9.0 Laboratory Simulations in Physiology by P. Zao, T stabler et al. Publisher: Pearson ISBN-13: 978-0-321-81557-6.

General Pathology: Kumar V, Abbas AK, and Fausto N and Aster JC. Robbins and Cotran: Pathologic basis of Disease. Eighth Edition. Elsevier Saunders Company, 2010.

Course description

This course is a continuation of MEDS530B; it covers the basics of human anatomy (gross anatomy, histology), physiology (cellular physiology and different organ system areas) and pathology (general, systemic and cellular pathology). We will review the structure, function and diseases of the major organ systems of the human body, with an overview of disease prevention and laboratory simulation of case studies for every organ systems. The course is oriented to pre-medical and health professional related students.

Course Objectives

Upon completion of this course, students should be able to:

- Utilize the appropriate anatomical terminology when referring to the human body.
- Recognize anatomy, physiology, and pathophysiology of the blood, heart and circulatory system, immune and lymph system, digestive system, respiratory system, urinary, and reproductive systems, and deal with different case studies, and identify symptoms, required pre-tests, confirmatory tests, and pathological conditions for these systems, and explain the behavioral ways for disease prevention.
- Apply computer simulation to understand structure and functions of the organ systems covered in the course.
- Integrate information from current clinical literature with basic anatomical concepts and how they relate to the normal or disease state.

Course Structure

Lectures

Students are responsible for all topics and issues discussed in the lectures, even if they are not covered in the textbook. All lectures will be posted on blackboard at least one day before the lecture day.

Presentations assignments 20%

One or two presentations of diseases will be assigned to each student at the beginning of the semester. Students will discuss signs and symptoms; other diseases that produce the same symptoms, risk factors, and diagnostic based on pre and post confirmatory tests, prevention method and therapeutic plan for that particular disease. Students can use different resources (Internet, literature, videos, etc.) to do the assignment. **Questions about each of the presentation will be included in the final exam.**

Homework & Online Laboratories

Will account for **10%** of the final semester grade.

Each student is responsible for completion of his/her own assignment/s and submission by the assign due day and time. Late assignments will not be accepted.

Midterm exams and Final

- 2 in-class Midterms worth **40%** (20% each), and a final exam worth **30%** of your total grade.
- Midterms will have 50 questions, and the final exam will have 100 questions

Grading System:

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| Grading Scale: | B+: 88-89% | C+: 78-79% | D+: 68-69% | F: <59% |
| A: 93-100% | B: 83-87% | C: 73-77% | D: 63-67% | |
| A-: 90-92% | B-: 80-82% | C-: 70-72% | D-: 60-62% | |

Lectures Description:

Session 1: (8/26) The Blood (Terminology and Anatomy) Blood Characteristics and components, Erythrocytes, Leukocytes (WBCs), Platelets/Thrombocytes. Complete blood test (CBC/Hemogram), Blood film, Functions of Blood and different blood cells, Response to Injury and/or Infection.

Session 2: (8/28) The Blood: (Physiology and Pathology) Haemostatic Process, Blood Transfusions, Blood Typing. General Erythrocytes, leukocytes and thrombocytes Disorders. Blood tests. Blood collection, hemocytometer, blood count, ESR, Hematocrit, and Hb conc. Blood Coagulation, Blood Groups.

Session 3: (9/4) Red blood cells disorders: Anemias and Erythrocytosis I: Red blood cells disorders: classification and diagnostic of Anemias. Mycroctic Anemias: IDA, sideroblastic anemias, Thalasemias.

Session 4: (9/9) Red blood cells disorders: Anemias and Erythrocytosis II: Normocytic anemias: aplastic anemia, hemolytic anemias: intra and extra-vascular, Macrocytic anemias: megaloblastic and non-megaloblastic anemias. Erythrocytosis and Polycytemias.

Session 5: (9/11) White Blood cells disorders: Benign leukocytes disorders: Leukopenias and leukocytosis: qualitative and quantitative disorders. Neutrophilias, Leukemoid reaction, eosinophilias, basophilias, monocytosis and lymphocytosis. Leukemias: definition, classification and diagnostic. Clinical cases.

Session 6: (9/16) The Heart (Terminology Anatomy and Physiology) Anatomy The Heart, Layers of the Heart Wall & Pericardium, Chambers, Pathway the blood through the heart; coronary circulations; Microscopic Anatomy of Cardiac Muscle; Intercalated Discs, Cardiac Muscle Contraction; Heart Physiology: Conduction system in the heart; extrinsic; EKG, Heart sounds; cardiac cycle; cardiac output; Regulation of the stroke volume; Regulation of the heart rate. Reading: Chapter 18, Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 7: (9/18) Blood Vessels & Blood Circulation (Terminology, Anatomy and Physiology) Anatomy of Arteries and Veins, types of blood vessels and capillaries; capillary exchange hemodynamics: factors affecting blood flow; Blood Pressure (BP); Peripheral Resistance; Heart, Major Arteries of Systemic and pulmonary Circulations, Arterial Supply of the Brain, Special Circulations (Circle of Willis, Hepatic portal circulation, Fetal circulation) Factors that Influence BP. **Reading:** Chapter 19 Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 8: (9/23): Lymphatic System and immune system I: (Terminology, Anatomy and physiology). Organs of the Immune System, The Lymphatic System, Lymphatic Capillaries, Functions of the Lymphatic system, Lymphatic Flow, Structure of a Lymph Node, Regional Lymph Node Groups, The Spleen structure and its functions, The Thymus, The Reticuloendothelial System.

Session 9: (9/25) Lymphatic System and Immune system II :(Anatomy and physiology) Characteristics of Immunity, signs/symptoms of inflammation, lines of defense, Immunity, cell mediated and humoral immunity. Protein electrophoresis, Western blot

Session 10: (9/30) Lymphatic System and immune system III :(Pathology) Lymphatic System, Spleen Disorders, Immune System disorders. Transplantation and immune system. Autoimmune disease.

Reading: Kumar V, Abbas AK, and Fausto N and Aster JC. Robbins and Cotran: Pathologic basis of Disease. Eighth Edition. Elsevier Saunders Company, 2010, chapter 13. Diseases of Lymph Nodes, Spleen and Thymus.

Session 11: (10/2) Laboratory & presentation Session: Blood, cardiovascular and Immune system diseases. Students will present a description of the symptoms, other diseases that produce the same symptoms, confounding symptoms and factors, risk factors, pre and post confirmatory tests, prevention method and therapeutic plan for that case.

Reading: Kumar V, Abbas AK, and Fausto N and Aster JC. Robbins and Cotran: Pathologic basis of Disease. Eighth Edition. Elsevier Saunders Company, 2010, chapter 11. Blood Vessels and chapter 12. The Heart.

Session 12: Midterm 1 (10/7)

Session 13: (10/9) Respiratory System I: Anatomy of Upper & Lower Respiratory Tracts.

Major organs; voice production; conducting zone; respiratory zone, respiratory membrane; mechanics of breathing: inspiration and expiration; respiratory volumes and respiratory capacities; respiratory function test

Reading: Chapter 22. Chapter 22 Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 14: (10/14) Respiratory System II: Gas Exchanges Between Blood, Lungs, and Tissues. External and internal Respiration, Gas Transport to Tissue Cells, How RBCs and HB bind to oxygen, Other Factors Influencing Hemoglobin Saturation; Neural Regulation of Respiration, Factors Influencing the Rate & Depth of Breathing. Pulmonary Irritant and inflation reflexes; Respiratory Adjustments: Exercise Medical Terms for Altered Breathing (Eupnea, Hyperpnea, Hypopnea, Tachypnea, Apnea, Dyspnea, Orthopnea, Anoxia, Suffocation, Hypercapnia, Hypoxia/Hypoxemia)

Reading: Chapter 22 Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 15: (10/16) Laboratory & presentation Session Respiratory Systems diseases

Students will present a description of the symptoms, other diseases that produce the same symptoms, confounding symptoms and factors, risk factors, pre and post confirmatory tests, prevention method and therapeutic plan for that case.

Session 16: (10/21) Digestive System I: Anatomy and Histology of GI tract and layers, Peritoneum, mouth and oral cavity, teeth and tongue, esophagus, stomach, small intestine, and large intestine Physiology of defecation.

Reading: Chapter 23 Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 17: (10/23) Digestive System II: accessory digestive organs (salivary glands, liver, gallbladder, pancreas), bile; physiology of the digestive process: digestion and absorption of macromolecules; neural and hormonal control of digestion. Phases of digestion: cephalic, gastric and intestinal; liver function tests.

Reading: Chapter 23 Anatomy and Physiology: Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 18: (10/28) Metabolism and nutrition: metabolic adaptations: absorptive and postabsorptive state; metabolism during fasting and starvation; heat; metabolic rate; body temperature homeostasis; fever; energy homeostasis and regulation of food intake: nutrition: requirements for carbohydrates, protein and lipids; lipoproteins.

Reading: Chapter 24 Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 19: (10/30) Urinary System: Overview of urinary system structure. kidney, nephron, glomerulus, renal capillaries, renal tubule, urinary bladder. Renal physiology: glomerular filtration, tubular reabsorption; tubular secretion; formation of diluted and concentrated urine, hormonal and neural control, renal tests; characteristics of urine, urine constituents, urinalysis.

Reading: Chapter 25 Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 20: (11/4) Fluid, Electrolyte and Acid-Base Homeostasis: composition of body fluids; regulation of water and solute loss; electrolytes balance; acid base balance; body buffer systems; acid-base imbalance; diagnostic.

Reading: Chapter 26 Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 21: (11/6) Laboratory & presentation Session: Digestive & Urinary Systems diseases

such as: Type 1 diabetes, Type 2 diabetes, Gestational diabetes, Signs and symptoms, Causes, Pathophysiology, Diagnosis, Screening, Prevention, Management, Prognosis, Epidemiology Laboratory determination of Glucose and HbA1c.

Students will present a description of the symptoms, other diseases that produce the same

symptoms, confounding symptoms and factors, risk factors, pre and post confirmatory tests, prevention method and therapeutic plan for that case.

Session 22: Midterm 2. (11/13)

Session 23: (11/18) Male Reproductive System: the male reproductive system: structure and function; spermatogenesis –meiosis steps, type of cells; spermiogenesis: characteristics; steps; sertoli or sustentacular cells: functions, structure; role in spermatogenesis; sperm morphology; hormonal regulation of male reproductive function; mechanism and effects of testosterone activity; pathway of sperm flow; ejaculatory ducts: structure and function ; urethra: structure and function ; accessory sex glands: seminal vesicles, prostate, bulbourethral. Type of secretions, structure and function; penis: structure and function; neural control of penile erection and ejaculation.

Reading: Chapter 27 Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 24: (11/20) Female reproductive system: ovarian follicles: from primordial to graafian follicles and ovulation; oogenesis and follicular development; follicular stages; difference between spermatogenesis and oogenesis; uterus: structure and function; phases of the female reproductive cycle; ovarian cycle; uterine cycle; hormonal control of the ovarian and menstrual cycles; vagina: structure and function; physiology of lactation.

Reading: Chapter 27 Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Session 25: (11/25) Reproductive System II & Development

Erectile dysfunction, Testosterone Abuse, Disorders of the Male Reproductive System, Prostatic Cancer, Testicular Cancer. Stages of development; Fertilization: Steps characteristics of the egg and sperm; Events before Fertilization; Sperm Contact during Fertilization; Events within the Egg; Cleavage of the Zygote; Formation of the Morula; Blastocyst Formation; Development of the Blastocyst; Implantation Development of the trophoblast; Gastrulation; Formation of Embryonic Membranes: Amnion, Yolk sac, Chorion, Allantois; Placenta: Structure and function; Organogenesis; Neurulation Events of Fetal Development; Maternal changes during pregnancy; Hormones of pregnancy; Stages of labor; Apgar Score.

Reading: Chapter 28. Human Anatomy and Physiology 8th (2010) by Elaine Marieb & Katja Hoehn

Thanksgiving (11/27-30)

Session 27: (12/2) Laboratory & presentation Session: Male and Female Reproductive Systems diseases Students will present a description of the symptoms, other diseases that produce the same symptoms, confounding symptoms and factors, risk factors, pre and post confirmatory tests, prevention method and therapeutic plan for that case.

Session 28: (12/4) Laboratory & presentation Session: Hereditary and Systemic Diseases Students will present a description of the symptoms, other diseases that produce the same symptoms, confounding symptoms and factors, risk factors, pre and post confirmatory tests, prevention method and therapeutic plan for that case.

Session 30: Final Week of 12/11-18 (TBA)

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be certain the letter is delivered to the instructor as early in the semester as possible. DSP is located in on the University Park campus in STU 301 and is open 8:30 a.m. – 5:00 p.m., Monday through Friday. The phone number is (213) 740-0776.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

<http://www.usc.edu/dept/publicationis/SCAMPUS/gov/>

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be a suspicion of academic dishonesty. The Review process can be found at <http://www.usc.edu/student-affairs/SJACS/>