

Integrated Organ-System Course 5: Cardiovascular, Pulmonary, and Renal (CPR)

Course Content:

The Cardio-Pulmonary-Renal course will provide an integrated approach to the cardiovascular, pulmonary, and renal systems. Students will acquire a broad understanding of the normal structure and function of each system. A comprehensive overview of pathophysiology, epidemiology, biostatistics, diagnostic tests, and therapeutic principles related to disorders of these systems will be covered.

Course Objectives:

- Describe the essential features of the autonomic nervous system and selected pharmacologic agents that act upon it.
- Describe the essential features of the gastrointestinal, endocrine, and reproductive systems, their normal structure and function, and the epidemiology, clinical features, pathogenesis, pathophysiology, and laboratory findings associated with gastrointestinal, endocrine, and reproductive diseases, including disorders of pregnancy.
- Identify appropriate therapeutic options for selected diseases of the gastrointestinal, endocrine, and reproductive systems.
- Describe how epidemiologic, socioeconomic, behavioral, sociocultural, and community factors may impact the care of patients with diseases of the gastrointestinal, endocrine, and reproductive systems.
- Describe how wellness, nutrition, hospitality principles, pain management, and integrative medicine may contribute to the care of patients with diseases of the gastrointestinal, endocrine, and reproductive systems.
- Recognize bioethical issues germane to the medical care of patients with diseases of the gastrointestinal, endocrine, and reproductive systems.
- Recognize end-of-life issues germane to patients with gastrointestinal, endocrine, and reproductive diseases.
- Construct a differential diagnosis based on the clinical presentation of a patient with a gastrointestinal, endocrine, and/or reproductive disease and apply diagnostic reasoning to narrow the differential.
- Develop pertinent clinical questions related to the diagnosis and/or treatment of gastrointestinal, endocrine, and reproductive diseases, and utilize appropriate resources to answer those questions in a self-directed fashion.

Content Distribution:

Week 1: Basics

Week 2: Vascular and mediastinum

Weeks 3-5: Cardiac

Weeks 6-8: Pulmonary

Weeks 9-11: Renal

Week 12: Synthesis

PBL Objectives:

- Demonstrate self-directed learning through the assessment of personal educational needs, the appropriate selection and use of learning resources, the acquisition, integration, and application of knowledge, and the assessment of educational progress.

- Demonstrate the interaction skills and discussion skills used in learning, educating, research, patient care, and advocacy.
- Demonstrate clinical reasoning to develop and refine differential diagnoses.
- Identify and use data and resources to formulate diagnostic assessments and treatment plans.
- Identify and use data and resources to formulate an integrated medical knowledge base.
- Demonstrate the integration of individual and social health processes that contribute to the complete picture of wellness and illness in patients.
- Analyze, interpret, and apply new data and knowledge relevant to clinical problems.

Weekly Objectives:

Week 1 – Basics

- Define resting membrane potential and describe the cellular/ionic basis and essential features of action potentials, including propagation and refractory periods.
- Recognize the salient histologic features of smooth muscle.
- Illustrate the basic macroscopic organization and functions of the autonomic nervous system.
- Describe the essential features of the sympathetic nervous system, including the origin of preganglionic sympathetic neurons, the location of sympathetic ganglia, the types of receptors and associated neurotransmitters, and the general characteristics of the fight or flight response.
- Describe the essential features of the parasympathetic nervous system, including the origin of preganglionic parasympathetic neurons, the location of parasympathetic ganglia, and the types of receptors and associated neurotransmitters.
- Describe how the sympathetic and parasympathetic nervous systems may work reciprocally or synergistically to produce coordinated responses in target organs.
- Describe the locations and mechanisms of selected adrenoceptors and cholinoreceptors.
- Recognize selected pharmacologic agents that alter autonomic nervous system function, and describe their basic physiologic effects.

Week 2 – Vascular and mediastinum

- Describe the normal embryology and anatomy of the neck and mediastinum.
- Recognize the salient histologic features of blood vessels and lymphatics.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected disorders that affect the blood vessel wall, including hypertensive disease, atherosclerosis, aneurysm, and arterial dissection.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected types of infectious and non-infectious vasculitis, as well as selected disorders of vascular hyperreactivity.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected vascular neoplasms.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected primary and secondary disorders of the mediastinum.

- Describe the epidemiology of selected diseases affecting the vasculature and mediastinum.
- Recognize the major therapeutic modalities for treating selected vasculopathies and mediastinal disorders, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Weeks 3 – Cardiac

- Describe the normal embryology and anatomy of the heart and great vessels.
- Recognize the salient histologic features of the heart and great vessels, integrating the cell biology and physiology of the tissues.
- Illustrate major features of the cardiac cycle, including cardiac conduction, wall mechanics, hemodynamics, and associated heart sounds.
- Describe the neural and hormonal mechanisms that control heart function.
- Define heart failure.
- Illustrate the major congenital heart defects, including left-to-right shunts, right-to-left shunts, and obstructive disorders, correlating the anatomic changes with the resulting clinical features.
- Describe the epidemiology of selected congenital heart defects.
- Describe the process by which electrical activity of the heart is recorded to generate an electrocardiogram (ECG/EKG).
- Recognize the salient features of a normal ECG/EKG tracing.

Week 4 – Cardiac

- Recognize selected ECG/EKG abnormalities and describe biologic disturbance underlying each of them.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected arrhythmias.
- Define and recognize common etiologies for sudden cardiac death (SCD).
- Define ischemic heart disease and differentiate between acute and chronic etiologies of insufficient myocardial perfusion.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with angina pectoris and myocardial infarction.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with systemic and pulmonary hypertensive heart disease.
- Describe the epidemiology of selected arrhythmias, ischemic heart disease, and hypertensive heart disease.
- Recognize the major therapeutic modalities for treating arrhythmias, ischemic heart disease, and hypertensive heart disease, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Week 5 – Cardiac

- Recognize the major types of valvular heart disease, and describe the etiology, clinical and diagnostic findings, and prognosis for each.
- Illustrate the pathogenesis of selected cardiomyopathies, including dilated, hypertrophic, restrictive, and selected forms of myocarditis.

- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected cardiomyopathies.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected primary cardiac neoplasms.
- Illustrate the pathogenesis of selected disorders of the pericardium, including pericardial effusions, hemopericardium, and pericarditis.
- Describe the epidemiology of selected diseases of the cardiac valves, cardiomyopathies, cardiac neoplasms, and pericardial disorders.
- Recognize the major therapeutic modalities for treating valvular heart disease and cardiomyopathies, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Weeks 6 – Pulmonary

- Describe the normal embryology and anatomy of the respiratory system, including the nasal cavities, nasopharynx, larynx, lungs, and pleura.
- Recognize the salient histologic features of the upper and lower respiratory systems.
- Recognize the main features of selected congenital anomalies involving the respiratory system.
- Illustrate and describe essential concepts of respiratory physiology, including lung volumes and capacities, the mechanics of breathing, gas exchange and transport, ventilation/perfusion relationships, and control of breathing.
- Define atelectasis and describe common mechanisms for its formation.
- Define pulmonary edema and describe common mechanisms for its formation.
- Define acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) and describe their relationship, pathogenesis, and typical clinical course.

Week 7 – Pulmonary

- Define and contrast obstructive versus restrictive lung diseases.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected obstructive lung diseases, including emphysema, chronic bronchitis, and asthma.
- Define chronic obstructive pulmonary disease (COPD) and describe how this disorder relates to emphysema and chronic bronchitis.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected restrictive lung diseases, including fibrosing diseases, granulomatous diseases, smoking-related interstitial diseases, and pulmonary alveolar proteinosis.
- Describe the epidemiology of selected obstructive and restrictive lung diseases.
- Recognize the major therapeutic modalities for treating selected obstructive and restrictive lung diseases, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Week 8 – Pulmonary

- Define and contrast community versus hospital-acquired pneumonia.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected infectious disorders of the lung, including bacterial, viral, and fungal pneumonias.

- Recognize how immunosuppression may alter susceptibility to specific pulmonary infections.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected neoplastic diseases of the lung, including carcinoma, neuroendocrine tumors, and metastatic tumors.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with pleural disorders, including effusions, pneumothorax, and selected pleural tumors.
- Describe the epidemiology of selected pulmonary infections and neoplasms.
- Recognize the major therapeutic modalities for treating significant infectious pneumonias, lung neoplasms, and pleural disorders, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Week 9 – Renal

- Describe the normal embryology and anatomy of the kidneys, ureters, and urinary bladder.
- Recognize the salient histologic and ultra-structural features of the kidney, ureter, and urinary bladder, integrating the cell biology and physiology of the tissues.
- Describe the principal clinical manifestations of chronic kidney disease.
- Define and contrast nephritic and nephrotic syndromes.
- Recognize the major histologic and/or ultra-structural changes associated with selected primary glomerular diseases, and describe how the changes relate to the underlying pathophysiology.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected primary glomerulopathies.
- Describe the epidemiology of selected diseases of the renal glomerulus.
- Recognize the major therapeutic modalities for treating selected primary glomerulopathies, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Week 10 – Renal

- Recognize the major histologic and/or ultra-structural changes associated with selected systemic diseases that involve the glomerulus, and describe how the changes relate to the underlying pathophysiology.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected systemic diseases that involve the glomerulus.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected tubular and interstitial diseases of the kidney.
- Describe the epidemiology of selected diseases of the renal glomerulus, tubule, and interstitium.
- Recognize the major therapeutic modalities for treating selected systemic glomerulopathies and tubular/interstitial diseases, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Week 11 – Renal

- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected vascular disorders that affect the renal system, including renal artery stenosis and diffuse cortical necrosis.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected congenital disorders that affect the renal system, including autosomal dominant polycystic kidney disease, autosomal recessive polycystic kidney disease, and medullary sponge kidney.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected obstructive disorders that affect the renal system, including urolithiasis.
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected neoplastic disorders that affect the renal system, including benign processes (e.g. angiomyolipoma, oncocytoma) and malignant processes (e.g. renal cell carcinoma).
- Describe the clinical features, pathogenesis, and diagnostic findings associated with selected disorders of the lower urinary system.
- Describe the epidemiology of selected vascular, neoplastic, and obstructive diseases of the kidney, as well as various disorders of the lower urinary system.
- Recognize the major therapeutic modalities for treating selected vascular, congenital, and neoplastic disorders of the kidney, as well as selected disorders of the lower urinary system, including the uses, contraindications, side effects, and major drug-drug interactions associated with various pharmacologic interventions.

Week 12 – Synthesis

- Describe the epidemiology, risk factors, pathogenesis, pathology, pathophysiology, clinical features, laboratory diagnosis, and treatment/management of selected complex, multisystem disorders that involved the cardiovascular, pulmonary, and/or renal systems.

Assessment & Grading:

Students will take two summative National Board of Medical Examiners (NBME) exams that use USMLE-style questions. They will also receive formative and summative assessments for small group activities (e.g. PBL), and complete several quizzes and/or written assignments. Students will receive a pass grade based upon satisfactory participation in small group activities, the timely completion of written assignments and exercises, and successful passage on summative NBME exams.

University Expectations:

Academic Misconduct – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See

the Student Academic Misconduct Policy (approved December 9, 2005) located at: <http://studentconduct.unlv.edu/misconduct/policy.html>.

Copyright – The University requires all members of the University Community to familiarize themselves and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC) – The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you.

If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to me during office hours so that we may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach me before or after class to discuss your accommodation needs.

Religious Holidays Policy – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, January 31, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. This policy shall not apply in the event that administering the test or examination at an alternate time would impose an undue hardship on the instructor or the university that could not have reasonably been avoided. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Incomplete Grades - The grade of I – Incomplete – can be granted when a student has satisfactorily completed all course work up to the withdrawal date of that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. A student who receives an I is responsible for making up whatever work was lacking at the end of the semester. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Tutoring – The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex (SSC). Students may learn more about tutoring services by

calling (702) 895-3177 or visiting the tutoring web site at: <http://academicsuccess.unlv.edu/tutoring/>.

UNLV Writing Center – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

Rebelmail – By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu.