

Integrated Organ-System Course 1: Introduction to Medical Sciences (IMS)

Course Content:

This block will establish foundational principles of biomedical science that are relevant to human medicine. The first half will be exposed to basic elements of biochemistry, molecular biology, cellular biology, genetics, and embryology. In the second half students will learn the underpinnings of pharmacology, basic concepts of histology and pathology, and conclude with an exploration of essential concepts in immunology. Students will also be exposed to foundational elements of epidemiology.

Course Objectives:

- Describe foundational concepts in human biology and medicine related to the disciplines of biochemistry, molecular biology, cellular biology, genetics, embryology, epidemiology, pharmacology, pathology, and immunology.
- Describe how epidemiologic, socioeconomic, behavioral, sociocultural, and community factors may impact the care of patients.
- Recognize bioethical issues germane to the medical care of patients.
- Develop pertinent clinical questions related to the diagnosis and/or treatment of human illness, and utilize appropriate resources to answer those questions in a self-directed fashion.

Content Distribution:

Week 1: Biochemistry and molecular biology

Week 2: Cellular biology

Week 3: Genetics and embryology

Week 4: Pharmacology and pathology

Weeks 5 & 6: Immunology

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 – Biochemistry and molecular biology

- Describe the basic molecular components of human cells, including nucleic acids, proteins, carbohydrates, and fatty acids.

- Illustrate the process of gene transcription and translation, including key regulatory elements.
- Describe the general process of protein folding and the acquisition of tertiary and quaternary structure.
- Define an enzyme and describe the general characteristics of enzymatic reactions, including kinetic properties.
- Illustrate the general features of cellular pathways used to synthesize ATP beginning with carbohydrate, fatty acid, and amino acid substrates.
- Describe the general biochemical features of selected small molecules, including amino acids, purines, pyrimidines, lipids, sugars, and certain alcohols, and recognize selected disorders associated with deficiencies in these molecules.
- Describe the general biochemical features of selected macromolecules, including complex carbohydrates, glycoproteins, and proteoglycans, and recognize selected disorders associated with deficiencies in these molecules.
- Describe fundamental concepts of measurement relevant to human medicine, including prevalence, incidence, sensitivity, specificity, and predictive value.

Week 2 – Cellular biology

- Describe the basic structure and organization of major cellular components, including the plasma membrane, cytosol, nucleus, and cytoskeleton.
- Describe the structure, distribution, and essential function(s) of organelles, including the mitochondrion, Golgi complex, endoplasmic reticulum, and lysosome.
- Illustrate the mechanisms of prototypic signal transduction pathways.
- Describe the structure and function of proteins that are necessary for cell adhesion and motility (e.g. cilia).
- Illustrate the general features of intracellular sorting and the key processes by which cells maintain homeostasis.
- Illustrate the general features of the cell cycle, including its major regulatory points.
- Recognize the key histologic features of basic tissue types.

Week 3 – Genetics and embryology

- Illustrate the major elements of human embryogenesis through gastrulation.
- Recognize significant patterns of human dysmorphogenesis.
- Utilize the principles of pedigree analysis to delineate patterns of inheritance and determine risk.
- Describe the key principles of population genetics, including the Hardy-Weinberg equilibrium and founder effect.
- Describe the key mechanisms by which chromosomal abnormalities occur, including translocation, deletion, and duplication.
- Illustrate the central elements of Mendelian inheritance.
- Discuss the general aspects of clinical genetics, including types of genetic testing, issues related to perinatal testing, and genetic counseling.
- Recognize the goals and promise of gene therapy, as well as the limitations to current therapeutic approaches

Week 4 – Pharmacology and pathology

- Describe the basic principles of pharmacokinetics, including drug absorption, distribution, metabolism, excretion, and dosage intervals.

- Describe the structure-function relationship of various pharmacologic agents that underlie their respective mechanisms of action.
- Illustrate the concepts of efficacy and potency.
- Describe and differentiate the major classes of agonists and antagonists.
- Describe how individual factors (e.g. age, gender, body weight, disease state, pharmacogenetics, etc.) will influence the pharmacokinetics and pharmacodynamics of various pharmacologic agents.
- Describe the adaptive cellular responses to nonlethal stress.
- Recognize common intracellular accumulations and describe their significance.
- Describe and contrast the mechanisms and outcomes of cell death.
- Illustrate the cells, mediators, and general sequence of events for an acute inflammatory response.
- Describe the cells, mediators, and general sequence of events for repair of damaged tissue.
- Describe the general process by which chronic inflammation perpetuates.

Weeks 5 & 6 – Immunology

- Describe the general features of the innate and adaptive arms of the immune system.
- Describe the functions of the main cells of the immune system, including granulocytes, macrophages, and lymphocytes.
- Describe the essential features of various components of the immune system, including antigens, antibodies, MHC proteins, and the complements system.
- Illustrate the basic processes by which the adaptive immune system responds to intracellular microbes.
- Illustrate the basic processes by which the adaptive immune system responds to extracellular microbes.
- Recognize the major types of congenital immunodeficiencies.
- Recognize the essential features of types I-IV hypersensitivity reactions.
- Recognize the immunologic principles underlying diagnostic laboratory tests.
- Recognize the major pharmacologic therapies capable of altering the immune response.

Assessment & Grading:

Students will take three 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.