Pathophysiology
Common Course Outline

Course Information
Revision History 2008-2009
Course Number BIOL 240
Division Liberal Arts and Sciences
Department Math and Sciences
Total Credits 2

Description
This course provides an in-depth study of the chemical, biological and psychological process involved with alterations of health, using systemic and non-systemic approaches. Besides the two hour lecture, this course meets one additional hour to work on case studies.

Types of Instruction

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<td>Lecture</td>
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Prerequisites
Human Physiology- Biology 230

Competencies

1. Define Pathophysiology.
   Learning Objectives
   a. Define common terms related to pathophysiology.
   b. List factors that contribute to pathophysiology

2. Explain how stress contributes to disease.
   Learning Objectives
   a. Describe the General Adaption Syndrome (GAS) and its stages
   b. List factors that influence GAS
   c. Describe the psychoneuroimmunologic regulation of stress
   d. Explain the role of hormones in stress regulation

3. Demonstrate a basic understanding of the cell
   Learning Objectives
   a. Describe cell functions.
   b. Describe the different modes of membrane transport.
   c. Describe cell reproduction and the 4 phases of the cell cycle.
   d. Identify the reasons for cell communication and methods of cell communication

4. Demonstrate a basic understanding of how cells adapt to injury
   Learning Objectives
   a. Explain the means in which a cell can adapt to injury
5. Demonstrate a basic understanding of the types of cell injury.
   Learning Objectives
   a. Describe the common characteristics of a cell with hypoxic injury
   b. Identify the types of hypoxia and stimuli that cause hypoxia
   c. Describe the common characteristics of cellular damage due to free radicals and reactive oxygen.
   d. Describe cellular damage that can occur as a result of physical agents, chemical agents and microorganisms
   e. Describe how immunologic and inflammatory responses can injure the cell.

6. Describe the changes resulting from a cell’s inability to adapt to an injury.
   Learning Objectives
   a. List the cellular changes that occur as a cell succumbs to injury

7. Demonstrate a basic understanding of the process of cell death
   Learning Objectives
   a. Describe the process of necrosis and apoptosis

8. Demonstrate a basic understanding of the genetic basis of disease
   Learning Objectives
   a. Describe protein synthesis and errors that can occur in protein synthesis
   b. Explain abnormalities that can occur due to errors in meiosis
   c. Develop a proficiency in the use of a punnett square to determine the phenotypic and genotypic ratios for certain diseases.
   d. Define autosomal dominant inheritance and list characteristics in this mode of inheritance
   e. Define autosomal recessive inheritance and list characteristics of this mode of inheritance
   f. Define X-linked inheritance and list characteristics in this mode of inheritance
   g. Describe multifactorial inheritance and list examples of disorders based on this mode of inheritance and characteristics of each disorder.
   h. Describe and interpret prenatal tests used to detect a genetic or developmental disorder

9. Describe how some environmental stimuli can cause congenital defects
   Learning Objectives
   a. List categories of teratogens, give examples of each and how each causes birth defects

10. Demonstrate a basic understanding of fluid, electrolyte and acid base balance
    Learning Objectives
    a. Describe the starling’s forces and how they influence fluid balance.
    b. Describe alterations in the starling’s forces that cause edema
    c. Describe the behaviors of edema
    d. Describe the means by which the body maintains sodium and water balance
    e. List and describe stimuli for volume disturbances and behaviors that result including hypovolemia and hypervolemia
    f. Identify symptoms that result from high levels or deficiencies in plasma electrolytes
    g. Identify the types and causes of pH imbalances and how the respiratory and renal systems compensate for those imbalances.
    h. Through arterial blood gas analysis, identify the type of pH disturbance and if the body is compensating for the disturbance

11. Demonstrate a basic understanding of the immune system and its role in Pathophysiology
    Learning Objectives
    a. List the basic features of immunity
b. Describe the role of B-lymphocytes, T-lymphocytes and cytokines in immunity
c. Describe the basic mechanisms involved in autoimmune disease
d. Describe the four types of hypersensitivity, the mechanisms involved in each and list examples of each type.
e. Describe congenital immunodeficiencies
c. Describe acquired or secondary immunodeficiency
d. Explain the four stages of HIV to AIDS and describe tests used to detect the progression of HIV

12. Demonstrate a basic understanding of inflammation
Learning Objectives
a. Describe the phases of inflammation
b. Identify the behaviors of inflammation including local and systemic inflammation
c. Describe the characteristics of acute and chronic inflammation
d. Describe the process for wound healing including regeneration, resolution and repair
e. List factors that can affect the wound healing process
f. Apply the information learned about inflammation to answer questions and make a diagnosis based on behaviors, medical tests and observations.

13. Demonstrate a basic understanding of infection
Learning Objectives
a. Describe infection in terms of how it spreads, resistance of the host, susceptibility and counter measures

14. Demonstrate a basic understanding of Cancer and tumor spread
Learning Objectives
a. Describe current trends and statistics in cancer
b. List common characteristics of all cancer types
c. Explain the mechanisms by which cancer establishes itself in healthy cells and spreads
d. Differentiate between malignant and benign tumors
e. Identify the properties of cancer including autonomy, anaplasia and the types of tumor markers
f. List and describe the categories of cancer
g. List risk factors for cancer and explain why these factors increase the likelihood of developing cancer.
h. List protective factors against cancer.
i. List clinical manifestations of cancer and explain why they occur
j. List and describe cancer therapies and their side effects

15. Demonstrate a basic understanding of altered levels of consciousness
Learning Objectives
a. Define consciousness and identify and explain levels of consciousness
b. Identify and describe the stages of coma
c. Identify and describe the altered patterns of breathing seen with brain damage
d. Describe changes that occur with brain damage that can cause altered levels of consciousness
e. Describe types, causes and neuerologic outcomes of cerebral edema
f. List characteristics of a vegetative state
g. Describe the pathophysiologic mechanisms that occur with increased intracranial pressure
h. List the four types of stroke and describe the clinical manifestations of each
i. Apply the information learned about stroke to further assess and provide a treatment plan for
the patient

16. Demonstrate a basic understanding of alterations in movement
   Learning Objectives
   a. Describe types of altered motor function

17. Demonstrate a basic understanding of spinal shock
   Learning Objectives
   a. Define spinal shock and list the symptoms of spinal shock

18. Demonstrate a basic understanding of traumatic brain injury
   Learning Objectives
   a. Describe the characteristics of traumatic brain injury

19. Demonstrate a basic understanding of the mechanisms of infection in the central nervous
    system
   Learning Objectives
   a. List and describe the ways in which infection can spread to the central nervous system
   b. Describe aspects of meningitis

20. Demonstrate a basic understanding of degenerative diseases of the nervous system
    Learning Objectives
    Describe the pathophysiology and clinical implications of Alzheimer's disease, Parkinson's
disease, multiple sclerosis and amyotrophic lateral sclerosis

21. Demonstrate a basic understanding of the endocrine system and alterations in its function
    Learning Objectives
    a. List the general functions of the endocrine system
    b. List the common characteristics of hormones
    c. Describe the regulation of hormone release
    d. Differentiate between lipid soluble and water soluble hormones
    e. Describe the role of the hypothalamus and pituitary in the endocrine system
    f. List the hormones produced and describe disorders that occur due to hypofunctioning and
       hyperfunctioning of endocrine glands

22. Develop a basic understanding of diabetes mellitus
    Learning Objectives
    a. Explain the pathophysiology and complications of diabetes mellitus
    b. Apply the information learned about diabetes to complete assessment, make a diagnosis
       and provide treatment for a patient with diabetes mellitus

23. Develop a basic understanding of the cardiovascular system and alterations in its function
    Learning Objectives
    a. Describe the basic functions of the cardiovascular system
    b. Describe alterations in the electrical activity of the heart
    c. Describe the pathophysiology of atherosclerosis
    d. List and describe the types of angina
    e. Describe causes and symptoms of heart failure and the compensatory mechanisms the
       body makes to maintain mean arterial pressure
    f. Describe and explain the symptoms, complications and diagnostic tests for myocardial
       infarction
    g. List and describe the types of shock and explain the complications that may result.
    h. Describe altered functioning of arteries and veins
i. Identify valve irregularities and explain their effects on the functioning of the heart.

j. Apply the information learned in the cardiovascular system to properly assess, diagnose and treat patients with alterations in the cardiovascular system

24. Develop a basic understanding of alterations in the functioning of the respiratory system

Learning Objectives
a. Describe the normal functioning of the respiratory system
b. List behaviors that can result from alterations in oxygenation and stimuli that can cause them
c. Explain the pathophysiology, behaviors and predisposing factors of acute respiratory distress syndrome and pulmonary edema
d. Compare and contrast asthma, bronchitis and emphysema in terms of the pathophysiology, clinical implications, diagnostic tests and treatment
e. Describe tuberculosis in terms of the causative agent, how it spreads and behaviors
f. Describe the pathophysiology and associated behaviors of pulmonary embolism
g. Apply the information learned about respiratory disorders to assess, diagnose and treat patients in case studies.

25. Develop a basic understanding of alterations in the functioning of the renal system.

Learning Objectives
a. Describe the basic functions of the kidney
b. List and define basic symptoms seen with alterations in renal function
d. Describe disorders of the kidney and bladder in terms of their pathophysiology and associated behaviors
e. Explain acute and chronic renal failure in terms of pathophysiology, symptoms, complications, diagnostic tests and treatments.
f. Through case studies, apply the information learned about alterations in renal function to assess, diagnose and provide a treatment plan

26. Develop a basic understanding of alterations in the functioning of the hematologic system.

Learning Objectives
a. Describe the components of blood and their functions
b. Describe the process of erythropoiesis and hemostasis
c. Describe the types of anemia and behaviors associated with each
d. Identify myeloproliferative red cell disorders and the associated behavior
e. Describe qualitative and quantitative alterations of leukocyte function
f. Describe alterations of lymphoid function
g. Explain the pathophysiology and behaviors associated with alterations in coagulation

27. Develop a basic understanding of alterations in the functioning of the gastrointestinal system and its accessory structures.

Learning Objectives
a. Describe the basic functions of the digestive system
b. Describe clinical manifestations of digestive alterations and possible causes
c. Describe disorders of the digestive system
d. Understand the basic functions of the liver and alterations in function in terms of the pathophysiology, stimuli and behaviors
e. Using case studies with clinical information, apply the information learned about liver alterations to assess, diagnose and treat the patients in the studies.
f. Understand the basic function of the gall bladder and alterations in function
28. Develop a basic understanding of alterations in the functioning of the musculoskeletal system

Learning Objectives
a. Describe the basic functions of the musculoskeletal system
b. Describe alterations in the musculoskeletal system including trauma and disorders of the bones and joints

29. Develop a basic understanding of the alterations in the function of the reproductive system

Learning Objectives
a. Describe the basic functions of the reproduction system
b. Describe disorders of the female reproductive system
c. Describe disorders of the male reproductive system
d. Identify the causes of infertility in males and females