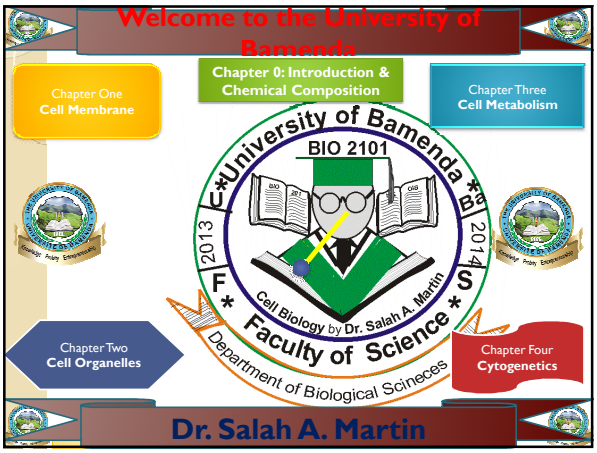
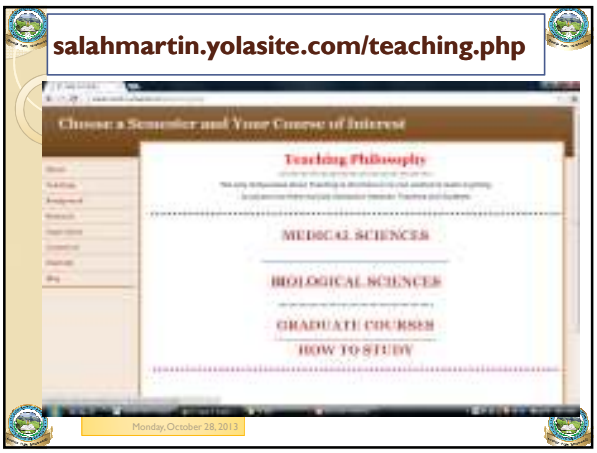
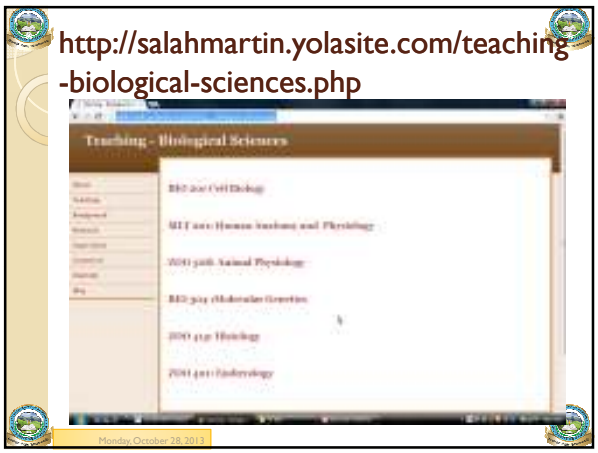
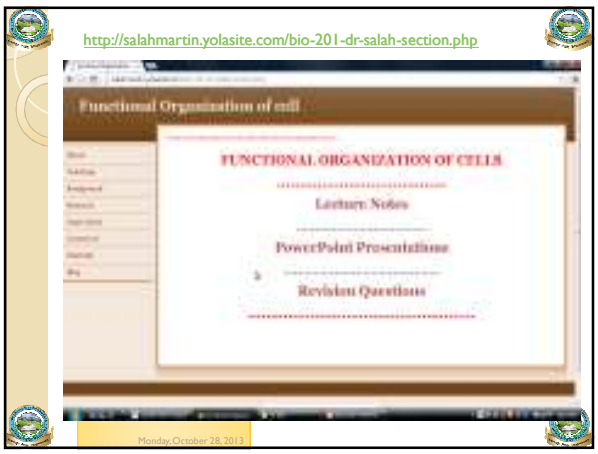

Welcome to the University of Bamenda
Chapter 0: Introduction & Chemical Composition
Chapter One Cell Membrane
Chapter Three Cell Metabolism
University of Bamenda
BIO 2101
2013
2014
Cell Biology by Dr. Salah A. Martin
Faculty of Science
Department of Biological Scineces
Chapter Two Cell Organelles
Chapter Four Cytogenetics
Dr. Salah A. Martin


salahmartin.yolasite.com
WELCOME TO Dr. SALAH's WEBSITE
Monday, October 28, 2013


salahmartin.yolasite.com/teaching.php
Choose a Semester and Your Course of Interest
Teaching Philosophy
MEDICAL SCIENCES
BIOLOGICAL SCIENCES
GRADUATE COURSES
HOW TO STUDY
Monday, October 28, 2013


http://salahmartin.yolasite.com/teaching-biological-sciences.php
Teaching - Biological Sciences
Monday, October 28, 2013


salahmartin.yolasite.com/bio-201-cell-biology.php
LECTURE SECTIONS OF THE COURSE
Monday, October 28, 2013


http://salahmartin.yolasite.com/bio-201-dr-salah-section.php
Functional Organization of cell
FUNCTIONAL ORGANIZATION OF CELLS
Lecture Notes
PowerPoint Presentations
Revision Questions
Monday, October 28, 2013

salahmartin.yolasite.com/bio-201-cell-organization.php


Monday, October 28, 2013

## Lecture Notes

Monday, October 28, 2013

salahmartin.yolasite.com/bio-201-powerpoint-presentations.php


Monday, October 28, 2013

## PowerPoint Presentations

Monday, October 28, 2013

http://salahmartin.yolasite.com/bio-201-revision-questions.php


Monday, October 28, 2013

## Past Examination

Monday, October 28, 2013

## Lecture Objectives

Home
Teaching
Background
Research
Supervision
Contact Us
EduCAM
Blog

**At the end of the lectures of Week 1; Monday the 19th of March 2012, the student would be able to:**

1. *Exploit the wen resources of the course*
2. *Discourse the cell Theory*
3. *Differentiate between prokaryotes and Eukaryotes*
4. *Describe the structure and the genetic constitution of a typical prokaryotic cell such as a bacterium*
5. *Sketch the ultrastructure of a typical eukaryotic cell.*
6. *Differentiate between plant and animal cells*
7. *Describe the constitution and functioning of a cell membrane.*
8. *Differentiate between primary and secondary active transport mechanisms*
9. *Relate diffusion potential with the membrane potential*
10. *State and give the functions of intercellular junctions.*
11. *Discuss the functioning of the G-protein*
12. .....

Monday, October 28, 2013

## Weekly Revision Questions

Home
Teaching
Background
Research
Supervision
Contact Us
EduCAM
Blog

**Revision Questions for Week 1: Monday 19 to Friday 24th March 2011**

1. **What is diffusion?**
2. **What is meant by concentration gradient? Is it correct to refer to "concentration gradient of water"?**
3. **What is the difference between osmosis and diffusion?**
4. **What is osmotic pressure?**
5. **Can solutions with the same concentration of different solutes have different osmotic pressures?**
6. **How are solutions classified according to their comparative tonicity?**
7. **Concerning permeability what type of membrane is the cell membrane?**
8. **What are the basic constituents of the cell membrane?**
9. **What are the respective functions of phospholipids, proteins and carbohydrates of the cell membrane?**
10. **What is the relationship between concentration gradient and active and passive transport?**
11. **What are the three main types of passive transport?**
12. **What is the energy source used in active transport through biological membranes?**
13. **What is the difference between simple and facilitated diffusion? Facilitated by which type of molecule does the term "facilitated" mean?**
14. **How does the intensity of simple diffusion vary in**

Monday, October 28, 2013

## Cell Theory

- **Cells** are the **smallest structures** that perform the processes essential to life, including consuming food, producing waste, and reproducing by making new cells.
- All cells arise from the division of **existing cells**.
- Every organism is made up of one or more cells.

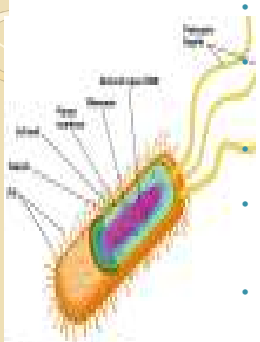
Monday, October 28, 2013

## Types of Cells

- **Prokaryotic cells** have no membrane-bound nuclei or membrane-bound**organelles.**
- Prokaryotic cells have ribosomes, cell walls, and sometimes flagella.
- Bacteria and archaea are made up of prokaryotic cells.
- **Eukaryotic cells** have membrane-bound nuclei and membrane-bound organelles.
- Eukaryotic organelles include the **nucleus, ribosomes, endoplasmic reticulum, Golgi bodies, mitochondria, lysosomes, vacuoles, chloroplasts, cytoskeleton, centrioles,** flagella, and cilia.
- Eukaryotic cells make up the protists, plants, fungi, and animals.

Monday, October 28, 2013

## Prokaryotic Cells



- Prokaryotic cells are generally smaller and much simpler than eukaryotic cells.
- They have no membrane-bound organelles or central nucleus containing their DNA. Instead of a nucleus, their DNA is concentrated in a region called a nucleoid.
- Bacteria and the archaea are the only two domains of organisms composed of prokaryotic cells.
- They are the most primitive organisms and are almost always single-celled, although some species form colonies in which labor is divided among specialized cells.
- Prokaryotic organisms were the earliest life forms on Earth and are highly adaptable, found in even the harshest environments today.

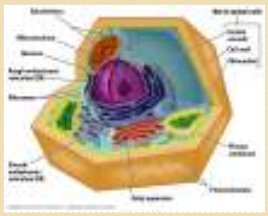
Monday, October 28, 2013

## Eukaryotic Cells

- Eukaryotic cells have a membrane-bound **nucleus** and membrane-bound organelles.
- The membrane-bound nucleus of each eukaryote contains **chromosomes,** piece s of DNA that are tightly folded up by proteins.
- The remaining substance of each eukaryotic cell consists of cytoplasm, which includes the cytosol and those organelles and materials suspended in it. Eukaryotic cells make up all organisms apart from bacteria and archaea.

Monday, October 28, 2013

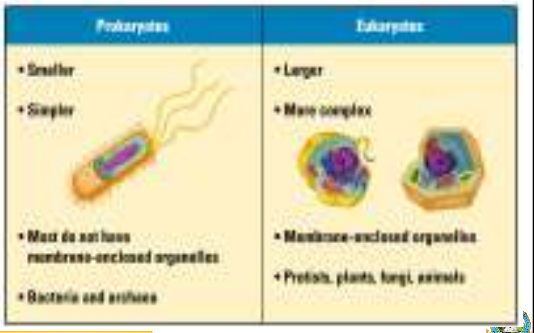
| Animal Cell | Plant Cell |
|---|---|



## Differences Between Plant and Animal Cells

Monday, October 28, 2013

## Differences Between Eukaryotic and Prokaryotic Cells




Monday, October 28, 2013

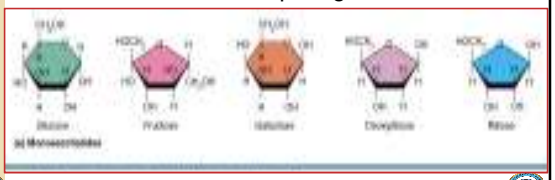
## Organic Compounds

- Carbohydrates
- Lipids
- Proteins
- Nucleic Acids

Monday, October 28, 2013

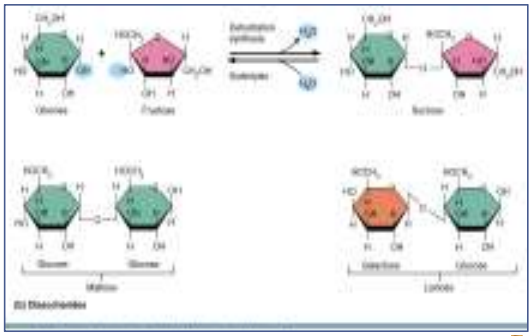
## Carbohydrates

- Contain carbon, hydrogen, and oxygen
- Their major function is to supply a source of cellular food
- Examples:
  - Monosaccharides or simple sugars



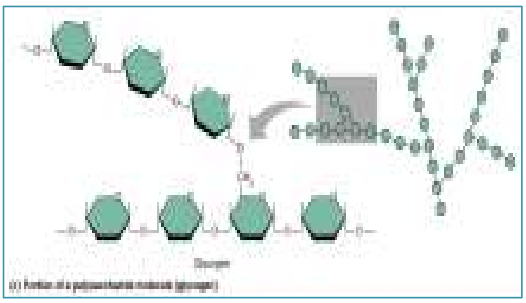
Monday, October 28, 2013

- Disaccharides or double sugars



Monday, October 28, 2013

- Polysaccharides or polymers of simple sugars



Monday, October 28, 2013

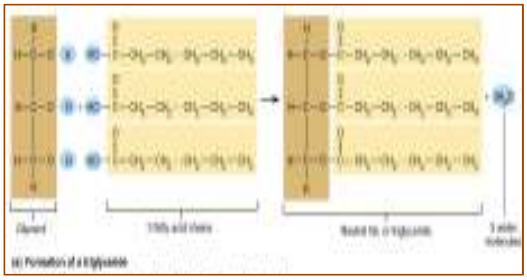
## Lipids

- Contain C, H, and O, but the proportion of oxygen in lipids is less than in carbohydrates
- Examples:
  - Neutral fats or triglycerides
  - Phospholipids
  - Steroids
  - Eicosanoids



## Neutral Fats (Triglycerides)

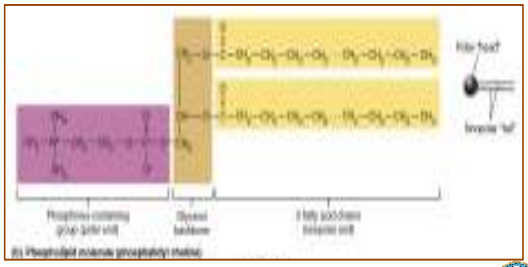
- Composed of three fatty acids bonded to a glycerol molecule





## Other Lipids

- Phospholipids – modified triglycerides with two fatty acid groups and a phosphorus group





- **Steroids** – flat molecules with four interlocking hydrocarbon rings
- **Eicosanoids** – 20-carbon fatty acids found in cell membranes



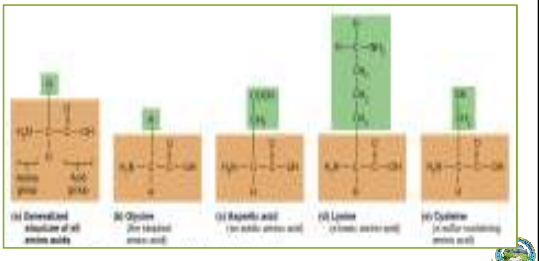
## Representative Lipids Found in the Body

- **Neutral fats** – found in subcutaneous tissue and around organs
- **Phospholipids** – chief component of cell membranes
- **Steroids** – cholesterol, bile salts, vitamin D, sex hormones, and adrenal cortical hormones
- **Fat-soluble vitamins** – vitamins A, E, and K
- **Eicosanoids** – prostaglandins, leukotriens, and thromboxanes
- **Lipoproteins** – transport fatty acids and cholesterol in the bloodstream

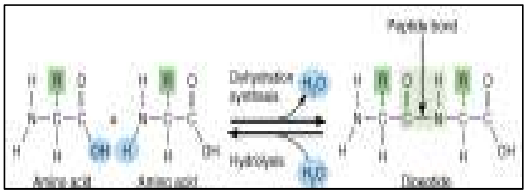


## Proteins

- **Amino Acids** are the building blocks of protein, containing an **amino group** and a **carboxyl group**
- Some examples of Amino acid and their structure are as follows



- Protein are macromolecules composed of combinations of 20 types of amino acids bound together with **peptide bonds**

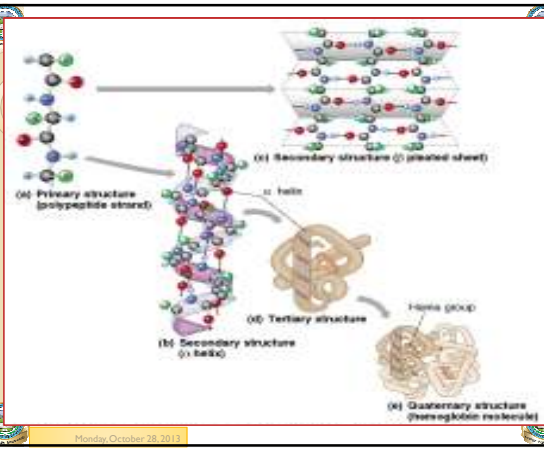





## Structural Levels of Proteins

- **Primary** – amino acid sequence
- **Secondary** – alpha helices or beta pleated sheets
- **Tertiary** – superimposed folding of secondary structures
- **Quaternary** – polypeptide chains linked together in a specific manner







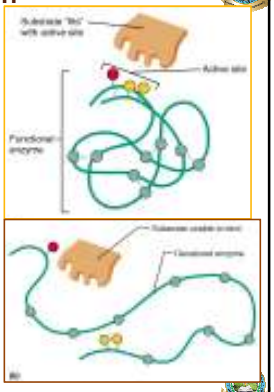

## Fibrous and Globular Proteins

- **Fibrous proteins**
  - Extended and strandlike proteins
  - Examples: keratin, elastin, collagen, and certain contractile fibers
- **Globular proteins**
  - Compact, spherical proteins with tertiary and quaternary structures
  - Examples: antibodies, hormones, and enzymes



## Protein Denaturation

- Reversible unfolding of proteins due to drops in pH and/or increased temperature
- Irreversibly denatured proteins cannot refold and are formed by extreme pH or temperature changes.





## Molecular Chaperones (Chaperonins)

- Help other proteins to achieve their functional three-dimensional shape
- Maintain folding integrity
- Assist in translocation of proteins across membranes
- Promote the breakdown of damaged or denatured proteins

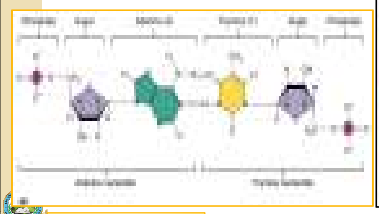
## Nucleic Acids

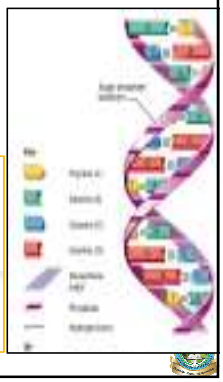
- Composed of carbon, oxygen, hydrogen, nitrogen, and phosphorus
- Their structural unit, the nucleotide, is composed of N-containing base, a pentose sugar, and a phosphate group
- Five nitrogen bases contribute to nucleotide structure – **adenine (A), guanine (G), cytosine (C), thymine (T), and uracil (U)**
- Two major classes – **DNA** and **RNA**



## Deoxyribonucleic Acid (DNA)

- Double-stranded helical molecule found in the nucleus of the cell
- Replicates itself before the cell divides, ensuring genetic continuity
- Provides instructions for protein synthesis







## Ribonucleic Acid (RNA)

- Single-stranded molecule found in both the nucleus and the cytoplasm of a cell
- Uses the nitrogenous base uracil instead of thymine
- Three varieties of RNA: messenger RNA, transfer RNA, and ribosomal RNA



## Adenosine Triphosphate (ATP)

- Source of immediately usable energy for the cell
- Adenine-containing RNA nucleotide with three phosphate groups