

CAPE Biology Unit 1 Scheme of Work 2011-2012

Term 1

DATE	SYLLABUS OBJECTIVES	TEXT PAGES	ASSIGNMENTS	COMMENTS
Orientation Week	Introduction to CAPE Biology syllabus – content and structure of the exam			
05-09 Sept 11	MODULE 1 – CELL AND MOLECULAR BIOLOGY Biological Molecules: Water: <ul style="list-style-type: none"> Describe the structure and properties of water and explain how these relate to the role that water plays as a medium of life. Carbohydrates: <ul style="list-style-type: none"> Relate the structure of glucose to its function Relate the structure of sucrose to its function 	Biological Sciences: 79-82, 82-89		
11-16 Sept 11	<ul style="list-style-type: none"> Discuss the molecular structure of starch, glycogen and cellulose to their functions in living organisms Triglycerides: <ul style="list-style-type: none"> Relate the structure of a triglyceride to its function as an energy source 	Biological Sciences: 89-92	Assessment: Structured question assessment on water LAB: Identification of unknown carbohydrates	
19-23 Sept 11	<ul style="list-style-type: none"> Relate the structure of phospholipids to its role in membrane structure and function. Proteins: <ul style="list-style-type: none"> Describe the generalized structure of an amino acid and the formation and breakage of a peptide bond. 	Biological Sciences: 140-141, 93-104	Assessment: Essay question on carbohydrates LAB: Quantitative tests of carbohydrates	
26-30 Sept 11	<ul style="list-style-type: none"> Explain the meaning of the terms: primary structure, secondary structure, tertiary structure and quaternary structure of proteins Describe the types of bonds that hold the protein molecule in shape 	Lab pages: 159-165	LAB: Test for proteins and lipids	

03-07 Oct 11	<ul style="list-style-type: none"> Outline the molecular structure of haemoglobin as an example of a globular protein and of collagen as an example of a fibrous protein, clearly establishing the relationship between structure and function 	Lab pages: 161-163	Assessment: Structured question on lipids LABS: Use of a light microscope	
10-14 Oct 11	<p>Cell Structure:</p> <ul style="list-style-type: none"> Describe and interpret drawings of the following organelles and membrane systems: Rough and smooth endoplasmic reticulum, Golgi body, mitochondria, ribosomes, lysosomes, chloroplasts, cell membrane, nuclear envelope, centrioles, nucleus and nucleolus <ul style="list-style-type: none"> Outline the functions of the organelles and membrane systems listed above 	Biological Sciences: 128-139, 147-159, 201, 275-277	Assessment: Essay question on Proteins LAB: Calibration of the eyepiece micrometer	
17-21 Oct 11	<ul style="list-style-type: none"> Compare and contrast the structure of typical plant and animal cells. Describe the structure of a prokaryotic cell and compare and contrast the structure of prokaryotic cells and eukaryotic cells Explain the concepts of tissue and organ using the dicot stem as an example 	Biological Sciences: 128-130	LABS: L.S. of a dicotyledonous stem	
24-28 Oct 11	<ul style="list-style-type: none"> Describe and explain the fluid mosaic model of membrane structure, including an outline of the roles of phospholipids, cholesterol, glycolipids, proteins and glycoproteins 	Biological Sciences: 142-147	Assessment: Test on cell structure LABS: Internal structure of a dicotyledonous stem	
31 Oct-04 Nov 11	<ul style="list-style-type: none"> Describe and explain the processes of diffusion, osmosis, active transport, endocytosis and exocytosis <p>Enzymes:</p> <ul style="list-style-type: none"> Explain that enzymes are globular proteins which catalyse metabolic reactions 		LABS: Cellular structure	
07-11 Nov 11	<ul style="list-style-type: none"> Explain the mode of action of enzymes in terms of an active site, E/S complex, lowering the activation energy and enzyme specificity 	Biological Sciences: 116-123	LABS: Osmotic relations in plant cells	

	<ul style="list-style-type: none"> Describe and explain the effects of pH, temperature, enzyme concentration and substrate concentration on enzyme action. Emphasize interpretation of graphs 			
14-18 Nov 11	<ul style="list-style-type: none"> Explain the effects of competitive and non-competitive inhibitors on enzyme activity Review of labs done to date 	Biological Sciences: 123-127	Question on protein structure LAB: Effect of substrate concentration on the rate of an enzyme controlled reaction	
25 Nov 11	End of Term Exams			
02 Dec 11	<p>RNA and DNA</p> <ul style="list-style-type: none"> Illustrate the structure of RNA and DNA Explain the importance of hydrogen bonds and base pairing in DNA replication <ul style="list-style-type: none"> Explain the relationship between the sequence of nucleotides and the amino acid sequence in a polypeptide 	Biological Sciences: 105-109	LAB: Gas production by yeast/glucose mixture at different temperatures Assessment: Question on enzymes	
09 Dec 11	<p>MODULE 2 – GENETICS VARIATION AND NATURAL SELECTION</p> <ul style="list-style-type: none"> Describe the roles of DNA and RNA in protein synthesis Explain the relationship between the structure of DNA, protein structure and the phenotype of an organism Describe the relationship between DNA, chromatin and chromosomes 		LAB: The effect of enzyme concentration on activity of amylase	
12-13 Dec 11	<ul style="list-style-type: none"> Describe with the aid of diagrams, the processes involved in mitotic cell division (include interphase) Explain the importance of DNA replication for maintaining genetic stability Discuss the role and importance of mitosis in growth, repair and asexual reproduction 		LAB: drawings from prepared slides of root tip squash to show the stages of mitosis	

Term 2

DATE	SYLLABUS OBJECTIVES	TEXT PAGES	ASSIGNMENTS	COMMENTS
02-06 Jan 12	<p>MODULE 2 – GENETICS VARIATION AND NATURAL SELECTION</p> <p>RNA and DNA</p> <ul style="list-style-type: none"> • Illustrate the structure of RNA and DNA • Explain the importance of hydrogen bonds and base pairing in DNA replication • Explain the relationship between the sequence of nucleotides and the amino acid sequence in a polypeptide • Describe the roles of DNA and RNA in protein synthesis 	Biological Sciences: 790-807	Module test on Module 1	
09-13 Jan 12	<ul style="list-style-type: none"> • Explain the relationship between the structure of DNA, protein structure and the phenotype of an organism • Describe the relationship between DNA, chromatin and chromosomes • Describe with the aid of diagrams, the processes involved in mitotic cell division (include interphase) • Explain the importance of DNA replication for maintaining genetic stability • Discuss the role and importance of mitosis in growth, repair and asexual reproduction 	Biological Sciences: 778-783	Assessment: Structured question on RNA and DNA LABS: Effect of substrate concentration on the rate of enzyme controlled reaction	
16-20 Jan 12	<ul style="list-style-type: none"> • Explain what is meant by homologous pairs of chromosomes, and the terms haploid and diploid • Describe with the aid of diagrams, the processes involved in meiotic cell division • Describe how meiosis contributes to heritable variation • Explain the terms: gene, allele dominant, recessive, codominant, homozygous and 	Biological Sciences: 783-790	LABS: The effect of temperature on activity of enzyme amylase Project outline given in syllabus objectives	

	<p>heterozygous</p> <ul style="list-style-type: none"> To construct models to demonstrate chromosome behavior in meiosis (Project) 			
23-27 Jan 12	<ul style="list-style-type: none"> Use genetic diagrams to solve problems involving monohybrid and dihybrid crosses Analyse the results of a genetic cross by applying the Chi-square test Outline the principles of restriction enzyme use in removing sections of the genome Explain the steps involved in recombinant DNA technology Discuss the possible benefits and hazards of gene therapy Discuss the implications of the use of genetically modified organisms on humans and the environment 	Biological Sciences: 834-878	<p>Assessment: Genetic engineering to be researched and presented in class by students</p> <p>Essay question on genetic engineering</p> <p>LABS: Gas production by yeast/glucose</p>	
31 Jan-03 Feb 12	<ul style="list-style-type: none"> Explain why sexually produced organisms vary in characteristics Describe gene and chromosome mutations Discuss the implications of changes in DNA nucleotide sequence for cell structure and function in sickle cell anaemia Explain how mutation brings about genetic variation Explain how heritable variation is important to selection Explain how environmental factors act as forces of natural selection 	Biological Sciences: 808-833	LABS: Drawings from prepared slides of root tip squash to show the stages of mitosis	
06-10 Feb 12	<ul style="list-style-type: none"> Explain how natural selection may be an agent of constancy or an agent of change Discuss how natural selection brings about evolution Discuss the biological species concept Explain the process of speciation 	Biological Sciences: 886-908, 909-928, 701-710	<p>Assessment: Essay question on natural selection</p> <p>LABS: to construct models to demonstrate chromosome behavior in meiosis</p>	
13-17 Feb 12	MODULE 3: REPRODUCTIVE BIOLOGY			

	<ul style="list-style-type: none"> • Explain the term asexual reproduction • Discuss the advantages and disadvantages of asexual reproduction • Explain the principles and the importance of vegetative propagation as exemplified by the use of cuttings and tissue culture • Discuss the genetic consequences of asexual reproduction 			
20-24 Feb 12	<ul style="list-style-type: none"> • Describe the structure of the anther and the formation of pollen grains • Describe the structure of the ovule and the formation of the embryo sac • Explain how cross-fertilization is promoted • Discuss the genetic consequences of sexual reproduction • Explain the sequence of events from pollination to fertilization • Explain the significance of double fertilization in the embryo sac • Discuss the development of the seed and the fruit from the embryo sac and its contents, the ovule and the ovary 	Biological Sciences: 711-723	Assessment: Module test on module 2 LABS: To make drawings of the anther and embryo sac from prepared slides	
27 Feb-02 Mar 12	<ul style="list-style-type: none"> • Describe the structure and function of the male and female reproductive systems • Explain gametogenesis • Compare the structure of the ovum and the sperm • Discuss how the structure of the ovum and the sperm suit their functions • Explain how hormones regulate gametogenesis • Discuss the importance of hormones in the control of the menstrual cycle • Describe how and where fertilization and implantation normally occur • Discuss how knowledge of human reproductive anatomy and physiology has been applied to the 	Biological Sciences: 724-757	Assessment: Multiple choice questions on asexual reproduction LABS: to make drawings from prepared slides of the mammalian ovary and testis	

	development of contraceptive methods <ul style="list-style-type: none">• Explain the structure and functions of the placenta• Discuss the possible effects of maternal behavior on foetal development			
05-09 Mar 12	MOCK EXAMS			