

| Topics covered on previous exams   | Topics covered on specimen paper  | Topics that have not appeared on any exams   |
|--|---|--|
| <p><u>June 10:</u></p> <ul style="list-style-type: none"> <li>State that biotechnology is the industrial use of living organisms (or parts of living organisms) to produce food, drugs or other products.</li> <li>Outline how microorganisms can be genetically modified (essay)</li> <li>Relate genotypes to phenotypes</li> <li>Recessive epistasis</li> <li>Genetic crosses</li> <li>Chi squared test</li> <li>Suggest how studying other organisms can still be related to humans</li> <li>Homeobox gene (briefly)</li> <li>Describe how information coded on genes is used to synthesise polypeptides and how these polypeptides control development of organism (essay)</li> <li>Similarity and difference between structure and function of synapse and neuromuscular junction</li> <li>Synoptic: non-competitive inhibitors</li> <li>DRD4 receptor (briefly)</li> <li>Electrophoresis (very briefly)</li> </ul> | <ul style="list-style-type: none"> <li>Sex linkage (brief)</li> <li>Genetic cross</li> <li>Chi squared test</li> <li>Describe an example of how environment affects phenotype</li> <li>Describe how lac operon is expressed</li> <li>Explain what is meant by a gene mutation</li> <li>Suggest why some alleles allow normal functioning while others do not</li> <li>Energy transfer through ecosystem</li> <li>% energy that is not converted into growth</li> <li>Energy transfer from primary consumers to decomposers</li> <li>Genetic engineering- how isolated gene is inserted into plasmid</li> <li>Two ways of identifying bacteria which have taken up modified plasmid</li> <li>Why insulin from humans is preferable to pigs (brief)</li> <li>Protein synthesis within a fungus (essay)</li> <li>Structures of the brain (brief)</li> <li>How hypothalamus regulates hormone concentrations</li> <li>Plant hormones: gibberellins and auxins</li> <li>Apical dominance</li> <li>Definition of immobilised enzyme</li> <li>Outline how enzymes can be immobilised (brief)</li> <li>Advantages of immobilised enzymes</li> </ul> | <ul style="list-style-type: none"> <li>Explain meaning of the term genetic code</li> <li>Explain that mutations can have a beneficial, neutral or harmful effects on the way a protein functions (point mutations etc..)</li> <li>State that cyclic AMP activates proteins by altering their 3D structure</li> <li>Outline how apoptosis can act as a mechanism to change body plans</li> <li>Describe the behaviour of chromosomes during meiosis and the associated behaviour or the nuclear envelope, cell membrane and Centrioles</li> <li>Explain the terms allele, locus, phenotype, genotype, dominant, recessive and codominant</li> <li>Explain the terms linkage and crossing over</li> <li>Explain how meiosis and fertilisation can lead to variation through independent assortment of alleles, independent assortment of chromatids, crossing over and mutation (possible essay?)</li> <li>Use genetic diagrams to solve codominance problems</li> <li>Describe differences between continuous and discontinuous variation</li> <li>Explain basis of continuous and</li> </ul> |

|   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Mutations- frameshift</li> <li>• Natural selection or allele of DRD4 receptor gene</li> <li>• Why small population does not increase in size- carrying capacity, interspecific competition</li> <li>• Species richness and evenness (brief)</li> <li>• Reasons for conserving biological resources</li> <li>• Sustainable timber production</li> <li>• Plant responses- Absciscic acid and gibberellins</li> <li>• Two commercial uses of plant growth substances</li> </ul> <p><u>January 2011:</u></p> <ul style="list-style-type: none"> <li>• Artificial selection in dairy cows</li> <li>• Two techniques used in selective breeding</li> <li>• Gene mutation definition</li> <li>• Natural selection (brief)</li> <li>• Lac operon- regulatory gene and structural gene</li> <li>• Outline function of lac operon</li> <li>• Compare structure and function of the 3 types of muscle- voluntary, involuntary and cardiac</li> <li>• Structure of the brain (brief)</li> <li>• Closely related</li> </ul> | <ul style="list-style-type: none"> <li>• Synoptic: hydrolysis definition</li> <li>• Definition: primary succession</li> <li>• Role of pioneer species</li> <li>• Deflected succession</li> <li>• How biomass changes during primary succession</li> <li>• How ecosystems can be managed sustainably (timber production) (essay)</li> </ul> | <p>discontinuous variation by reference to the number of genes which influence the variation</p> <ul style="list-style-type: none"> <li>• Explain why variation is essential in selection</li> <li>• Use the Hardy-Weinberg principle to calculate allele frequencies in populations</li> <li>• Explain, with examples, how environmental factors can act as stabilising or evolutionary forces of natural selection</li> <li>• Explain how genetic drift can cause changes in small populations</li> <li>• Explain the role of isolating mechanisms in evolution of new species</li> <li>• Biological species concept</li> <li>• Phylogenetic species concept</li> <li>• Compare and contrast artificial selection and natural selection (possible essay?)</li> <li>• Outline differences between reproductive cloning and non-reproductive cloning</li> <li>• Natural clones in plants- vegetative propagation</li> <li>• Small scale plant cloning- grafting and cutting</li> <li>• Describe production of artificial clones of plants from tissue culture (large scale)</li> <li>• Advantages and disadvantages of plant cloning in agriculture</li> <li>• Describe how animals can be cloned (possible</li> </ul> |
|---|--|--|

|   |  |   |
|---|--|---|
| <p>species to humans</p> <ul style="list-style-type: none"> <li>• Describe how activation of the fight or flight response affects voluntary, involuntary and cardiac muscle (essay)</li> <li>• Net primary production in ecosystems</li> <li>• How energy content can be measured (calorimeter)</li> <li>• How the trophic level or a mammal affects food energy converted into biomass</li> <li>• Standard growth curve of batch culture</li> <li>• Evidence of secondary metabolite (brief)</li> <li>• Importance of aseptic conditions</li> <li>• Three physical factors that must be controlled in the fermenter- PH, temperature, oxygen concentration</li> <li>• Enzyme definitions</li> <li>• Describe that different genes can be found in different types of cell as they code for different functions</li> <li>• Compare in vitro gene cloning (PCR) to in vivo gene cloning (essay)</li> <li>• Ecology definitions</li> <li>• Animal behaviour + examples: habituation, operant</li> </ul> |  | <p>essay?)</p> <ul style="list-style-type: none"> <li>• Explain why immobilised enzymes are used in large scale production</li> <li>• Compare and contrast continuous and batch culture (possible essay?)</li> <li>• Describe differences between primary and secondary metabolites</li> <li>• Outline steps of sequencing genome of organism (possible essay?)</li> <li>• Outline how gene sequencing allows for genome-wide comparisons of species and individuals</li> <li>• Define: recombinant DNA</li> <li>• Outline how DNA fragments can be separated by electrophoresis</li> <li>• Describe how DNA probes can be used to identify fragments containing specific base sequences</li> <li>• Outline PCR (possible essay?)</li> <li>• Describe the advantage to microorganisms of the capacity to take up plasmid DNA from the environment</li> <li>• Outline the process involved in genetic engineering of golden rice</li> <li>• Outline how animals can be genetically engineered for xenotransplantation</li> <li>• Explain the term gene therapy</li> <li>• Differences between somatic cell gene</li> </ul> |
|---|--|---|

|  |  |   |
|--|--|---|
| <p>conditioning, social behaviour in primates and its importance</p> |  | <p>therapy and germ line cell gene therapy (possible essay?)</p> <ul style="list-style-type: none"> <li>• Define biotic factor and abiotic factor</li> <li>• Describe how distribution and abundance of organisms can be measured using line transects, belt transects, quadrats and point quadrats (possible essay?)</li> <li>• Describe how microorganisms recycle nitrogen + general nitrogen cycle as possible essay?</li> <li>• Describe predator-prey relationships</li> <li>• Explain interspecific and intraspecific competition</li> <li>• Outline how human activities effect populations of plants and animals on Galapagos Islands (possible essay?)</li> <li>• Different tropisms in plants- photo, chemo etc..</li> <li>• How hormones are used in leaf loss of deciduous plants</li> <li>• Commercial uses of plant hormones</li> <li>• Outline organisation of nervous system- central and peripheral (possible essay?)</li> <li>• Outline functions of the cerebrum, cerebellum, medulla oblongata and hypothalamus (possible essay?)</li> <li>• Describe how co-ordinated movement requires action of skeletal muscles about</li> </ul> |
|--|--|---|

|  |  |   |
|--|--|---|
|  |  | <p>joints, in reference to elbow joint</p> <ul style="list-style-type: none"><li>• Sliding filament model of muscle contraction (possible essay incorporating stimulating contraction with neuromuscular junction?)</li><li>• Outline role of ATP in muscular contraction, and how supply of ATP is maintained in muscles</li><li>• Explain advantages of innate behaviour</li><li>• Describe escape reflexes, taxes and kinases as examples of genetically- determined innate behaviours</li><li>• Describe imprinting, classical conditioning, latent and insight learning</li><li>• Describe how DRD4 dopamine receptor may contribute to understanding of human behaviour</li></ul> |
|--|--|---|

