University of York

Department of Biology

B. Sc and MBiol Stage 3 Degree Examinations 2015-2016

BIO00027H Research Skills
Open Essay Paper

● Answer ONE question only.

● Your essay must include an abstract of not more than 250 words

● Your essay should not be longer than 3,000 words, longer essays will be penalised. Please refer to the Departmental WEB pages for penalties on extended essays

● You should not approach academic staff for help with this assignment

● Put your examination number and the question number of your essay on the front of the examination cover booklet

● Submit an electronic copy of your essay to the VLE assessment submission point before your submit the hard copy to the Biology Undergraduate Office

● Your essay should be submitted to the Biology Undergraduate Office (C009) by 12.00 noon on Monday 16 November 2015

● Please refer to Departmental WEB pages for late submission penalties
1. Discuss the causes and consequences of resource pulses in terrestrial ecosystems.

2. How can ecology be used to develop cost-effective methods of animal disease control?

3. What is the evidence that protected areas are effective conservation measures and how can we improve them?

4. What processes are responsible for generating the high species diversity found in the Amazon?

5. "Biodiversity loss in the UK cannot be halted without a shift in farming attitudes away from maximizing production". Discuss this proposition.

6. Past research on the post-glacial vegetation history of the British Isles will help predict the effect of climate change in the future. Discuss.

7. Are glucosinolates effective tools in a plant's arsenal for controlling soil-borne pests?

8. Discuss the extent to which the historical development of technology has provided our models and metaphors for living systems.

9. Discuss the views suggesting that there are only two domains of life, bacteria and archaea, and that eukaryotes evolved from archaea.

10. Was the evolution of human life inevitable?

11. Can bacterial species be defined using concepts that are widely applied to eukaryotes?

12. Why do the genomes of higher eukaryotes contain so many transposable elements?

13. Discuss the role of genome duplication in the evolution of developmental mechanisms in animals.

14. Discuss the molecular mechanisms responsible for the plant gravitropic response.

15. Compare and contrast anti-viral responses in plants and animals.

16. How can modern plant breeding help to minimise the use of the nutrient phosphorus?
17. Evaluate approaches for modeling microbial communities.

18. Discuss how algae can be engineered for human benefit.

19. Discuss the role of the gut-brain axis in mood.

20. Compare the structure, biogenesis and cellular function of lipid droplets and peroxisomes.

21. Discuss the contribution of non-mammalian model organisms to understanding the human immune system.

22. Evaluate the link between inflammation and neurodegeneration at the cellular level.

23. Discuss the technical challenges of genome editing for disease therapy in differentiated tissues.

24. Discuss the role of rapamycin as a cure for many chronic diseases.

25. Discuss whether Akt, Erk and other key signalling centers are good targets for drug therapy.

26. Discuss the biological advantages and disadvantages of alternatives to animal models in research.

27. What role does mechanical force have in signal transduction at the intracellular and intercellular levels?

28. How do the chloroplasts and nucleus communicate and why is this important?

29. Evaluate the promise of electrogenic microbes in energy technology.

30. Why is symmetry common and asymmetry rare in homo-oligomeric proteins?

31. Discuss the importance of the ergodic hypothesis with respect to enzyme behaviour.

32. Why are some codons used more frequently than alternatives that specify the same amino acid?
33. Discuss how recent advances in medicinal chemistry have addressed the challenges of bacterial resistance to natural antibiotics.