

PRIFYSGOL BANGOR BANGOR UNIVERSITY



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ARHOLIADAU YSGOLORIAETHAU MYNEDIAD 2025 SCHOLARSHIP ENTRANCE EXAMINATIONS 2025

PWNC / SUBJECT: Bioleg / Biology

**Amser a ganiateir: 2 awr
Time allowed: 2 hours**

**Cyfarwyddiadau:
Instructions:**

Answer TWO questions (write each answer in a SEPARATE answer book)

- 1) Considering the properties of water, discuss why it is essential to the development of life and why the discovery of water on planets in our solar system (or their moons) will increase the probability of finding extraterrestrial life. If found, what type of life could this be?
- 2) Discuss the mode of action of antibiotics with specific reference to tetracycline and penicillin and explain how the overuse of antibiotics in farming has led to the spread of antibiotic resistance amongst a wide range of pathogenic bacterial species.
- 3) Epigenetics (the control of gene expression by factors other than changes in the DNA) has recently been recognised as an important gene control expression. Explain how epigenetics works, using specific named examples and speculate on how lifestyle changes could affect our genetic health.
- 4) Explain how a protein can be synthesised from a gene. Include details on gene transcription, the splicing out of introns from pre-mRNA and the translation of mRNA on ribosomes to create a growing polypeptide chain. Discuss whether the central dogma of molecular biology DNA > RNA > Protein is still valid as it has been discovered that many genes are regulated by microRNAs which do not code for proteins.
- 5) Cardiovascular disease is one of the major causes of death in developed countries. Discuss how the high intake of saturated fat and its connection to low density lipoprotein (LDL) cholesterol level leads to heart disease. Include a discussion on the current treatments for cardiovascular disease including statins, angioplasty and lifestyle changes.

- 6) With specific reference to the structure of the human genome, discuss the discovery of DNA fingerprinting by Professor Alec Jeffreys at the University of Leicester – the science behind the discovery, and how it is currently being used in forensic science and in paternity profiling.
- 7) The “microbiome” is currently a topic of increasing scientific interest and research. What is the human microbiome and why is it so important to our health? Can the composition of the human microbiome be changed to make it more beneficial for us?
- 8) Explain how metabolism can be explained as a series of enzyme-controlled reactions and how environmental conditions can alter the three-dimensional structure of enzyme molecules. Include an analysis of competitive and non-competitive inhibition.