**The Nottingham Emmanuel School – BTEC Applied ScienceCurriculum Map (2022-2023)**

|  |  |
| --- | --- |
| Intent statement | The science curriculum at Emmanuel will provide students with the new knowledge needed to navigate the modern world. This will allow our students to develop their scientific literacy which will enable them to make informed decisions. This will empower and equip our students to be good role models, who are mindful of the word around them and give them the skills to make meaningful contributions to society. We aim to remove barriers to learning through raising aspirations via an inclusive and diverse curriculum for all students. |
| Diversity across the curriculum | Our curriculum represents the diversity of our students by promoting science as accessible to all. We will use inclusive language, images and texts and promote scientific role models that represent the diversity of our school community. We will deliver the science curriculum with an awareness of the different religious beliefs of our students whilst being mindful of any unconscious bias. |
|  |  | AUT 1 | AUT 2 | SPR 1 | SPR 2 | SUM 1 | SUM 2 |
| Year 12 | Title and objectives | **Unit 1 – B1****Cell structure and function****Unit 1 – A1****Structure and bonding****Unit 1 – B2****Cell specialisation** | **Unit 1 – C1****Working with waves****Unit 1 – A2** **Uses of substances and their properties****Unit 1 – C2****Waves in communication****Unit 1 – B3****Tissue structure and function****Unit 1 – C3****EM waves** | Unit 2C – ChromatographyUnit 2B – Calorimetry | Unit 2A – Titration and Colorimetry | Unit 2D – Personal review of scientific skills | Unit 11B – Cell DivisionUnit 11C – Principles of inheritance |
| Core knowledge | * Cell Theory
* Ultrastructure of cells
* Microscopy
* Gram-positive/negative bacteria
* Electronic structure
* Ionic bonding
* Covalent bonding
* Metallic bonding
* Intermolecular forces
* Quantities in reactions
* Structure of the leaf
* Root hair cells
* Blood cells
 | * Features of a wave
* Graphical representation of waves
* Longitudinal and transverse waves
* Wave concepts
* Applications of diffraction gratings
* Wave equation
* Resonance
* Wave speed
* Periodic table
* Physical properties of elements
* Chemical properties of elements
* Fibre optics
* Uses of fibre optics in medicine
* Uses of fibre optics in communication
* Epithelial tissue
* Endothelial tissue
* Muscle tissue
* Nervous tissue
* Wave speed
* Inverse square law
* EM spectrum
* Uses of different waves in communication
 | * Undertake chromatographic techniques to identify components in mixtures
* Undertake calorimetry to study cooling curves
 | * Undertake titration and colorimetry to determine the concentration of solutions
 | * Review own practice
* Evaluate skill development
 | * Human chromosomes
* Cell division and its role in variation
* Practical demonstration of slide preparation of dividing cells
* Principles of classical genetics
* Further genetics
 |
| Skills | * Microscopy calculations
* Microscopy
* Scientific drawing
* Balancing equations
* Mass calculations
* % yields
* Concentration calculations
 | * Graphical representation
* Equations
* Data analysis and temperature scales
* Microscopy
 | * Chromatography
* Analysis of chromatograms
* Sample preparation
* Calculations
* Precision of equipment
* Cooling curves
* Calculations using graphs
 | * Titration
* Colorimetry
* Preparing standard solutions
* Molar calculations
* Calibration graphs
 | * Error
* Evaluation
 | * Microscopy
* Scientific drawing
* Sample preparatio
* Ratio
* Using model organisms
* Genetic crosses
* Statistical tests
 |
| Covid recovery | Focus on practical skills and applications |
| Careers | Application of laboratory skills on roles in industry. Skills learnt delivered in context of how they are used in industry. Part of the criteria for the reflection in Unit 2D involves explaining when and how skills developed will be used in industry- students will do research into this. |  |
| Year 13 | Title and objectives | **Unit 3 – Plants****Unit 3 - Fuels** | **Unit 3 – Diffusion****Unit 3 – Circuits****Unit 3 - Enzymes** | **Unit 11D – Genetic Engineering****Unit 11 A – Gene expression and protein synthesis** | **Unit 3 revision – Plants, Fuels, Diffusion, Circuits, Enzymes** | **Unit 3 revision and external exam** |  |
| Core knowledge | * Factors affecting plant growth and distribution
* Sampling techniques
* Sampling sizes
* Fuels
* Hazards associated to fuels
* Units of energy
 | * Factors affecting the rate of diffusion
* Arrangement and movement of molecules
* Uses of components in series and parallel
* Equations
* Energy usage
* Protein structure
* Enzymes as catalysts
* Factors affecting enzyme activity
 | * DNA techniques
* Genetic engineering technologies
* Structure and function of nucleic acids
* Gene expression
* Protein synthesis
 |  |  |  |
| Skills | Planning* Hypothesis development
* Selecting equipment
* Health and safety
* Variables

Data collection and analysis* Quantitative analysis
* Qualitative analysis
* Processing data

Conclusions and evaluation* Interpretation of data
* Evaluating
 | Planning* Hypothesis development
* Selecting equipment
* Health and safety
* Variables

Data collection and analysis* Quantitative analysis
* Qualitative analysis
* Processing data

Conclusions and evaluation* Interpretation of data

Evaluating | * DNA extraction
* Electrophoresis
* DNA Amplification
 | Planning* Hypothesis development
* Selecting equipment
* Health and safety
* Variables

Data collection and analysis* Quantitative analysis
* Qualitative analysis
* Processing data

Conclusions and evaluation* Interpretation of data

Evaluating | Planning* Hypothesis development
* Selecting equipment
* Health and safety
* Variables

Data collection and analysis* Quantitative analysis
* Qualitative analysis
* Processing data

Conclusions and evaluation* Interpretation of data

Evaluating |  |
| Covid recovery | Focus on practical skills and applications |
| Careers | Application of laboratory skills on roles in industry. Skills learnt delivered in context of how they are used in industry.Possibility of a visit to biotechnology lab to see PCR in context. |  |  |  |