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| **Minor Award Name** | Biology |
| **Minor Award Code** | 5N2746 |
| **Level** | 5 |

**Suggested resources to support delivery:**

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| **Theme/Topic** | **Type** | **Relevance** | **Author/Source** | **Web Link** |
| Plant and animal cell identification | Youtube video link  Free web link | This animation shows the function of plant and animal cells including organelles like the nucleus, nucleolus, DNA (chromosomes), ribosomes, mitochondria, etc.  Free Biology topic specific Revision quizzes | [Nucleus Medical Media](https://www.youtube.com/channel/UC85VW73bQLEjs_taFKP7TwQ)  Softschools.com | <https://www.youtube.com/watch?v=URUJD5NEXC8>  <http://www.softschools.com/quizzes/biology/cell_structure/quiz356.html> |
| Identify a range of plant and animal cell types, outlining the structure and functions of major organelles and the fundamentals of cellular metabolism | Free web link  Youtube video | Detailed Power point presentation outlining the Organelles of the Cell  Introduction to Cells | [Beverly Biology](https://www.youtube.com/channel/UCei_f4D7xgutJ7MXOJhGzgw)  Frank Gregorio | <https://www.youtube.com/watch?v=RKmaq7jPnYM>  <https://www.youtube.com/watch?v=gFuEo2ccTPA> |
| Explain the functions of a variety of cell types, differentiating between mitosis and meiosis | Youtube video link | Paul Andersen explains mitosis and meiosis and shoes how the cell cycle is used to create new cells. | [Bozeman Science](https://www.youtube.com/channel/UCEik-U3T6u6JA0XiHLbNbOw) | <https://www.youtube.com/watch?v=2aVnN4RePyI> |
| Explain the factors that influence photosynthesis and transpiration | Free web link  Youtube video link  Youtube video link | Photosynthesis – detailed lesson from Khan Academy with in-depth explinations  Photosynthesis Light reaction, Calvin cycle, Electron Transport 3D Animation  Photosynthesis  Transportation in Plants | [Khan Academy](https://www.youtube.com/channel/UC4a-Gbdw7vOaccHmFo40b9g)  [Encyclopédie Médicale](https://www.youtube.com/channel/UC3kkrt4z41nxGI54J6uubVA)  Softschools.com  [7activestudio](https://www.youtube.com/channel/UCflmr7Tyyy38MaAENetim_g) | <https://www.youtube.com/watch?v=-rsYk4eCKnA>  <https://www.youtube.com/watch?v=wJDlxp17rY4>  <http://www.softschools.com/quizzes/science/photosynthesis/quiz388.html>  <https://www.youtube.com/watch?v=bvPM6sfidY4> |
| Outline the life cycle of a bacterium, fungus and virus including examining the structure of each | Free web link  Youtube video link  Youtube video link  Youtube video link  Youtube video link  Free web link | About microbiology  Detailed resource extensively covering a wide range of topics in the area of microbiology  Introduction to bacteria  Bacterial Reproduction & Exchanges of Genetic Material - Details of Binary Fission, Bacterial Conjugation, Transformation, and Transduction  Introduction to Viruses  Bacteria and Viruses: Science  Introduction to Fungi  What are Fungi  Introduction to the Fungi | Microbiology Society  Craig Savage  Craig Savage  Frank Gregorio  BIGNFLUFFY67  Dovebiology  Harvard Museum of Natural History  berkeley.edu | <http://www.microbiologyonline.org.uk/about-microbiology/introducing-microbes>  <https://www.youtube.com/watch?v=2iysq1kkTSk>  <https://www.youtube.com/watch?v=7sZ5Nz8_cfc>  <https://www.youtube.com/watch?v=UEKS4w9bfJg>  <https://www.youtube.com/watch?v=3xRttWuf3wQ>  <https://www.youtube.com/watch?v=u3okZKylH9Y>  <https://www.youtube.com/watch?v=70LA0mijzCM>  <http://www.ucmp.berkeley.edu/fungi/fungi.html> |
| Describe the main pathogenic agent infection pathways | Web Link | Pathogenic microorganisms and Infection transmission | Skwirk on line education | <http://www.skwirk.com/p-c_s-4_u-92_t-212_c-711/pathogenic-microorganisms/nsw/pathogenic-microorganisms/small-world-microbiology-/microorganisms-and-the-human-body> |
| Describe the role of micro-organisms in a variety of industrial processes, including citric acid, methane production and cheese production | Web Link  Web Link  Youtube video link | Microbes and food- Friend or foe  Industrial microbiology – Environmental microbiology notes  Introduction To Industrial microbiology part 1 & part 2 | Microbiology Society  Department of Environmental Studies. College of Engineering Gandhi Institute of Technology and Management , Visakhapatnam  (Affiliated to Andhra University)  dreaming machine | <http://www.microbiologyonline.org.uk/about-microbiology/microbes-and-food>  <http://www.gitam.edu/eresource/environmental/em_maruthi/industrial.htm>  <https://www.youtube.com/watch?v=H116nGWrIlI> |
| Explain the basic structure and function of DNA and RNA and the effects of mutation on gene expression and the role of mutation in natural selection and evolution | Web Link | Learn Genetics – Genetic Science Learning Centre –  Extensive range of genic related topics, videos, notes and questions. | University of Utah Health Science | <http://learn.genetics.utah.edu/> |
| Outline the genotypes and phenotypes of the four blood groups and demonstrate the importance of compatibility in blood transfusions | Web link | Blood Group basics  Genetic Dominance: Genotype-Phenotype Relationships | Irish Blood Transfusion service  Scitable by Nature Education | <https://www.giveblood.ie/All_About_Blood/Blood_Group_Basics/>  <http://www.nature.com/scitable/topicpage/genetic-dominance-genotype-phenotype-relationships-489> |
| Describe the role of genetic engineering in the manufacture of a variety of industrial products and in the production of plant varieties resistant to pests and diseases | Newsletter and Web link  Web link | Detailed site containing up to date news and research on the health, environment and economic impacts of GMOs  Insect-resistant Crops Through Genetic Engineering | GMO Compass  University of Illinois & U.S. Department of Agriculture, Washington, D.C | <http://www.gmo-compass.org/eng/agri_biotechnology/breeding_aims/148.disease_resistant_crops.html>  <http://www.aces.uiuc.edu/vista/html_pubs/biotech/insect.htm> |
| Explain the basic structure and function of the antibody molecule | Web link | Detailed resource outlining a range of topics on antibiodies and how they work, - notes and videos - | pdLbiopharma | <http://pdl.com/technology-products/how-do-antibodies-work/> |
| Describe a breeding programme used to improve a specific crop and one used to improve a specific animal or animal product | Web link - Word document  Web Link | Agricultural Biotechnology  (Paper primarily drafted by Teagasc)  Research and Innovation programmes | Department of Agriculture and Food  Teagasc | <https://www.agriculture.gov.ie/media/migration/.../2020AgriBiotech.doc>  <http://www.teagasc.ie/crops/potatoes/breeding.asp> |
| Discuss the plants and animals found in a specified habitat using a range of keys. | Web Link | Detailed resource - A-Z-Animals.com was developed by Millie Bond as a simple resource for animal facts, information and resources. | Millie Bond | <http://a-z-animals.com/reference/habitats/> |
| Discuss the effects of common physical hazards on the human body and the appropriate safety precautions necessary to minimise hazards including use of common hazard symbols | Web Link  Book | A detailed resource containing information on all types of Hazards and the HAS is the national statutory body with responsibility for ensuring workers (employed and self-employed) and those affected by work activity are protected from work related injury and ill-health.  Physical Hazard Control: Preventing Injuries in the Workplace | Health and Safety Authority  Frank R. Spellman, Revonna M. Bieber | <http://www.hsa.ie/eng/Topics/Hazards/>  <https://books.google.ie/books?id=MtW6SbppyhsC&printsec=frontcover> |
| Outline the rights and responsibilities of employers and employees under health and safety legislation | Web Link | Workplace Health Regulations and duties of employers and employees | Health and Safety Authority | <http://www.hsa.ie/eng/Workplace_Health/> |
| Apply Mendels laws of inheritance to mono and dihybrid crosses | Web Link  Web Link | Overview of Mendelian laws of inheritance are statements about the way certain characteristics are transmitted from one generation to another in an organism  Detailed notes of Mendel's First Law of Genetics (Law of Segregation) | Science Clarified  North Dakota State University | <http://www.scienceclarified.com/Ma-Mu/Mendelian-Laws-of-Inheritance.html>  <https://www.ndsu.edu/pubweb/~mcclean/plsc431/mendel/mendel1.htm> |
| Select tools and techniques to culture, isolate and inoculate micro-organisms, identifying the main pathogenic agent pathways | Web Link  Youtube video link | The Microbiology Laboratory & Cultivation of Bacteria  Introduction to Microbiology Culture Techniques | Penn State University  Nicole Gentile, PhD | <http://docx.searchpdf.net/doc/pdf/download/www2__yk__psu__edu--~mph13--Unit%20I.doc>  <https://www.youtube.com/watch?v=Et1v8EQP10U> |
| Carry out biology experiments or investigations in a scientifically accurate and methodical manner | Youtube video link  Youtube video link  Web link  Web Link | Safe Science - In the Classroom  Top 10 Rules of Science Lab Safety  Biology and the Scientific Method  Extensive resource for Science teachers in Ireland | Edward Norman  Gabrielle Hendel  Biology.ie  The Irish Science Teachers’ Association (ISTA) | <https://www.youtube.com/watch?v=NjJz85bQqdM>  <https://www.youtube.com/watch?v=s6lOQ5_Vlok>  <https://www.youtube.com/watch?v=s6lOQ5_Vlok>  <http://www.ista.ie/news/laboratory-experiments-classroom> |
| Maintain laboratory reports within planned timelines and deadlines on experiments and investigation | Web link  Web Link | Guide for writing Lab Reports &  Scientific Papers  Powerpoint presentation on an approach to writing lab report | Study guides and strategies  Trinity College Dublin | <http://www.studygs.net/labreports.htm>  <https://student-learning.tcd.ie/assets/docs/reports_pg/Writing%20Scientific%20Reports.ppt> |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| Teagasc – Research and education Agency  The national body providing integrated research, advisory and training services to agriculture and the food industry. | [www.teagasc.ie/](http://www.teagasc.ie/) |
| The Irish Science Teachers’ Association (ISTA) is the Subject Association for teachers of Science in the Republic of Ireland | <http://ista.ie/> |
| Further Education Support Service | http://www.fess.ie/ |
| Trinity College Dublin | https://www.tcd.ie/Education/courses/ |

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| **MOOCs (Massive Online Open Courses)** | |
| Free access to online courses  Intro to Biology & life Science  Cell biology  Biology & genetics  Search regularly for new courses and new start dates | <https://www.mooc-list.com/>  https://www.mooc-list.com/categories/biology-life-sciences?static...  https://www.mooc-list.com/course/cell-biology-saylororg?static=true  https://www.mooc-list.com/course/dna-biology’s-genetic-code-edx?... |