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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 linkFree 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 linkYoutube video | Detailed Power point presentation outlining the Organelles of the CellIntroduction 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 linkYoutube video linkYoutube video link | Photosynthesis – detailed lesson from Khan Academy with in-depth explinationsPhotosynthesis Light reaction, Calvin cycle, Electron Transport 3D AnimationPhotosynthesisTransportation 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 linkYoutube video linkYoutube video linkYoutube video linkYoutube video linkFree web link | About microbiologyDetailed resource extensively covering a wide range of topics in the area of microbiologyIntroduction to bacteria Bacterial Reproduction & Exchanges of Genetic Material - Details of Binary Fission, Bacterial Conjugation, Transformation, and TransductionIntroduction to VirusesBacteria and Viruses: ScienceIntroduction to FungiWhat are FungiIntroduction to the Fungi | Microbiology SocietyCraig SavageCraig SavageFrank GregorioBIGNFLUFFY67DovebiologyHarvard Museum of Natural Historyberkeley.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 LinkWeb LinkYoutube video link | Microbes and food- Friend or foeIndustrial microbiology – Environmental microbiology notesIntroduction To Industrial microbiology part 1 & part 2  | Microbiology SocietyDepartment 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 basicsGenetic Dominance: Genotype-Phenotype Relationships | Irish Blood Transfusion serviceScitable 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 linkWeb link | Detailed site containing up to date news and research on the health, environment and economic impacts of GMOsInsect-resistant Crops Through Genetic Engineering | GMO CompassUniversity 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 documentWeb Link | Agricultural Biotechnology (Paper primarily drafted by Teagasc)Research and Innovation programmes | Department of Agriculture and FoodTeagasc | <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 LinkBook | 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 AuthorityFrank 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 LinkWeb Link | Overview of Mendelian laws of inheritance are statements about the way certain characteristics are transmitted from one generation to another in an organismDetailed notes of Mendel's First Law of Genetics (Law of Segregation) | Science ClarifiedNorth 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 LinkYoutube video link | The Microbiology Laboratory & Cultivation of BacteriaIntroduction to Microbiology Culture Techniques | Penn State UniversityNicole 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 linkYoutube video linkWeb linkWeb Link | Safe Science - In the ClassroomTop 10 Rules of Science Lab SafetyBiology and the Scientific MethodExtensive resource for Science teachers in Ireland | Edward NormanGabrielle HendelBiology.ieThe 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 linkWeb Link | Guide for writing Lab Reports & Scientific PapersPowerpoint presentation on an approach to writing lab report | Study guides and strategiesTrinity 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 AgencyThe 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 coursesIntro to Biology & life ScienceCell biologyBiology & geneticsSearch 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=truehttps://www.mooc-list.com/course/dna-biology’s-genetic-code-edx?... |