Unit 20: Genetics

Delivery guidance

Approaching the unit

The unit examines the importance of genetics in human health and development. It also covers the role of reproductive genetic technologies in aiding people to conceive and considers the ethical issues that are raised by the technology.

Delivering the learning aims

Learning aim A covers the role of genetics in human reproduction. Learners could prepare annotated diagrams to cover genetic structure and use case studies to link the effect of genes to the specific psychological traits.

Learning aim B is about the factors that affect both pre-natal and post-natal development and how both genetic and environmental factors can have an effect. Learners could base their learning on research of the different factors, then linking their notes to case studies discussing the effects of the factors on post-natal development, highlighting how care needs are met.

Learning aims C and **D** cover the contribution of reproductive and genetic technologies in advancing healthy life chances and their impact on individuals and society. The legislation that governs those technologies and the ethical challenges they present are also covered. Learners could research different technologies and present their findings to the whole group. The complete list of technologies should be covered across the group. The relevant legislation should be covered in the research. The presentations could then be used as a basis for class discussion on the ethical challenges presented by the technology.

Assessment model

Learning aim	Key content areas	Recommended assessment approach
A Understand genetics and its role in human inheritance from conception to birth	**A1** The role of genetics in human reproduction **A2** The way in which natural conception occurs and patterns of pre-natal growth	A report, using a case study, on the role of genetics, the impact of factors affecting healthy pre-natal development, and how difficulties related to reproduction affect post-natal development and care needs through the life course.
B Examine the factors affecting pre- and post-natal development	**B1** Factors affecting pre-natal development **B2** Effects on post-natal development through life's course	
C Investigate how advances in science can contribute to understanding reproductive and gene technologies	**C1** Contribution of reproductive and gene technologies in advancing healthy life chances **C2** Impact of reproductive and gene technologies on individuals and society	A report on the role of reproductive and gene technologies in promoting life chances and causing ethical challenges for a selected individual with a specific genetic disorder and for society.
D Examine how legislation and ethical challenges influence the use of reproductive and gene technologies	**D1** Legislation and regulation governing reproductive and gene technologies **D2** Ethical challenges for those working with reproductive and gene technologies	

Assessment guidance

This unit is internally assessed. There is a maximum of two summative assignments for this unit. Tutors should refer to the assessment guidance in the specification for specific detail, particularly in relation to the requirements for Pass, Merit and Distinction grades.

It is suggested that **learning aims A and B** are assessed via a written report based on a case study. In the report, learners should evaluate the role of genetics in, and the impact of factors on, healthy pre-natal development. They should also evaluate how difficulties related to reproduction can affect post-natal development and care needs. Learners should demonstrate that they can assess and explain the relevant information throughout their evaluative report.

Learning aims C and D are also best approached through a written report. The report should evaluate the role of reproductive technologies in promoting life chances and causing ethical challenges for individuals with specific genetic disorders and for society. It should also evaluate the role of genetics in development and the contribution of reproductive and gene technologies in promoting life chances for individuals and for society. The report should refer to ethical challenges. Learners should show in their evaluative report that they can analyse the information and explain the reproductive and gene technologies they discuss, demonstrating an understanding of the ethical issues. Learners should have access to relevant legislation relating to policy in the field of genetics.

Getting started

This gives you a starting place for one way of delivering the unit, based around the recommended assessment approach in the specification.

Introduction
Introduce this unit by discussing the process of foetal development from conception to birth, including how pre-natal development can have a post-natal effect on development.
Learning aim A: Understand genetics and its role in human inheritance from conception to birth
• Learning aim A is about the role of genetics in human inheritance. • For A1, learners could produce an illustrated glossary that covers the genetic terms, principal structure and composition of the genetic code. It could also include the different psychological traits that are influenced by heredity. • For A2, learners could produce annotated timelines to show the changes in cell division and chromosomal behaviour, including chromosomal developments during foetal growth.
Learning aim B: Examine the factors affecting pre- and post-natal development
• Learning aim B covers the genetic and environmental factors that affect pre-natal and post-natal development. • For B1 and B2 learners could use case studies they have researched to show the effects of different factors on development.
Learning aim C: Investigate how advances in science can contribute to understanding reproductive and gene technologies **Learning aim D: Examine how legislation and ethical challenges influence the use of reproductive and gene technologies**
• For C1and C2, and D1 and D2, learners could research different technologies and their impact on individuals and society. They could then go on to link them to the relevant legislation and the resulting ethical issues. Learners could share their findings with the whole group to ensure that all the different aspects are covered among the group.

Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

This unit links to:

- Unit 11: Scientific Techniques for Health Science
- Unit 13: Microbiology for Health Science
- Unit 19: Medical Physics Applications in the Health Sector
- Unit 21: Biomedical Science
- Unit 22: Biochemistry for Health

Resources

Textbooks

Annets F, Foale S, Llewellyn R, Musa I, Hocking S, Patrick E, Sorensen J, Kelly T and Hudson L – *BTEC Level 3 National Applied Science Student Book*
(Pearson, 2010) ISBN 9781846906800

Any current Level 3 textbook with a section on genetics and genetic engineering.

Journals

New Scientist
www.newscientist.com

Royal College of Nursing
www.rcn.org.uk/magazines

Scientific American
www.scientificamerican.com

Nursing Times
www.nursingtimes.net

Websites

Howard Hughes Medical Institute

www.hhmi.org
Search for 'Bacterial Identification Virtual Lab' for an introduction to the science and techniques used to identify bacteria from their DNA sequences. Contains a section about analysing DNA.

EuroStemCell

www.eurostemcell.org

Contains links to resources and articles covering a broad range of genetics topics.

DNA Learning Center
www.dnalc.org/websites/dnai.html
Contains interactive activities about DNA and related issues.

Khan Academy
www.khanacademy.org
Search for 'DNA as the genetic material', 'DNA replication' and 'DNA proofreading and repair' for information about DNA replication.

Nuffield Foundation
www.nuffieldfoundation.org
Search for 'investigating mitosis allium root tip squash' for a practical worksheet on mitosis.

Science & Plants for Schools
www.saps.org.uk
Search for 'amplification of chloroplast' for resources on amplification of chloroplast/DNA.

International Union of Biochemistry and Molecular Biology
https://iubmb.onlinelibrary.wiley.com)
Search for an article about 'DNA extraction techniques for use in education' which appears in the journal *Biochemistry and Molecular Biology Education*, Vol. 38, No. 3, pp. 161–166 (2010).