

Unit 12: Scientific Basis of Healthcare Science: Genetics, Genomics and Clinical Bioinformatics

Level:	4
Unit type:	Optional (General Healthcare Science)
Credit value:	10
Guided learning hours:	80

Unit summary

In this unit, you will be introduced to genetics, genomics, and clinical bioinformatics, which for healthcare science spans genomics, health informatics science and physical science). This will provide you with a broad base for your scientific knowledge and professional practice, laying the foundation on which to build your knowledge, skills, and professional practice as you move through this programme of learning.

You will be introduced to each subject area through the learning outcomes and associated additional information. You will then deepen, develop, and apply your learning in the context of the healthcare science division and specialism in which you are working.

Unit assessment requirements

There are no specific assessment requirements for this unit. Please refer to the assessment strategy in *Annexe B*.

Additional information

Learning outcome 1

‘Personalised/precision medicine’ – as yet there is no standardisation of terms in this new area of science/medicine, so the terms are currently interchangeable.

AC1.1 includes the structure of the healthcare science division of clinical bioinformatics:

- genomics
- health informatics science
- physical sciences.

AC1.2–1.9 includes the principles and core concepts of clinical genetics, genomics and personalised/precision medicine in the context of individuals referred to healthcare science services:

- meiosis and Mendelian inheritance

- nucleic acid structure and function
- chromosome structure and function
- nomenclature used to describe the human genome, how it is used and how it can influence a person's health
- common genetic disorders
- impact of genetic disorders on the individual and their family
- genomic technology and the role of the genome in the development and treatment of disease
- personalised medicine
- the role of genomic counselling.

AC2.1 includes an introduction to clinical bioinformatics and health informatics.

Clinical bioinformatics brings together the disciplines of computer science, mathematics, statistics and physics/engineering to influence, analyse and inform clinical and biological practice, so helping to maintain safety of the individual and the integrity and security of data. Learners should be introduced to the three specialisms of clinical bioinformatics in healthcare science (genomics, health informatics science and physical sciences) in the context of:

- innovation, translation and interpretation of complex genomic data, optimising the benefits this brings to individual care, including personalised medicine
- the development and adoption of technology solutions and biomedically motivated methods for the collection, management, movement, analysis and use of health information in line with government legislation to improve the quality and safety of healthcare practice and delivery
- devices that may have therapeutic, diagnostic or patient monitoring functions and generate ever-increasing amounts of data that contribute to patient management.

Teaching should be tailored to the learner group using examples relevant to health and healthcare science.

- Contribution of clinical bioinformatics genomics, health informatics sciences and physical sciences to:
 - individual safety
 - individual care
 - healthcare
 - healthcare science.
- Governance and ethical frameworks.
- Storage and sharing of images, Digital Imaging and Communications in Medicine (DICOM).
- Picture Archiving and Communications Systems (PACS).
- Clinical information systems and applications.
- Clinical information systems and applications, e.g. Health Level 7 (HL7).

- Database management.
- Direct access to test results for individuals.

AC2.2 should be assessed in the context of:

- individuals referred to healthcare science services
- laboratory/investigative techniques.

AC2.3 includes:

- Digital Imaging and Communications in Medicine (DICOM)
- Picture Archiving and Communications Systems (PACS).

AC2.4 could include:

- Health Level 7 (HL7).

Learning outcomes and assessment criteria

To pass this unit, learners need to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the principles and core concepts of clinical genetics, genomics and personalised/precision medicine	1.1	Describe the structure of the Healthcare Science Division of Clinical Bioinformatics			
		1.2	Explain the terms genomics, genetics and personalised medicine			
		1.3	Explain the terms gene, DNA, chromosome, mutation			
		1.4	Explain the process of meiosis and Mendelian inheritance			
		1.5	Explain the structure and function of nucleic acid and chromosomes			
		1.6	Explain the fundamentals of the human genome			
		1.7	Explain the principles and core concepts of clinical genetics, genomics and personalised/precision medicine			
		1.8	Evaluate the potential impact of genetic disorders on patients and their families			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.9	Discuss some of the ethical issues that may arise in the use of genetic and genomic data			
2	Understand the principles of clinical bioinformatics and the impact on health, healthcare and healthcare science services	2.1	Explain the contribution of clinical bioinformatics (genomics, health informatics sciences and physical sciences) to healthcare			
		2.2	Explain the governance and ethical frameworks underpinning clinical bioinformatics			
		2.3	Explain the principles of systems for the storage and sharing of images			
		2.4	Evaluate clinical information systems and applications within healthcare and healthcare science services			
		2.5	Explain the purpose and principles of database management within healthcare and healthcare science services			
		2.6	Discuss the advantages and disadvantages for patients and healthcare staff of providing direct patient access to test results			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)