UNIVERSITY OF CAMBRIDGE

Institute of Continuing Education

Undergraduate Certificate in Genetics

2017-2018

Course code: 1718CCR105

COURSE GUIDE

University of Cambridge Institute of Continuing Education, Madingley Hall, Cambridge, CB23 8AQ
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Welcome to the **Undergraduate Certificate in Genetics**, a University of Cambridge award offered by the Institute of Continuing Education (ICE). The Certificate is taught and awarded at FHEQ level 4 (i.e. first-year undergraduate level) and attracts 60 credits. The award is completed in one academic year and each unit (term) is equally weighted. For further information about academic credit please see our website http://www.ice.cam.ac.uk/studying-with-us/information-for-students/faqs/3-credit-faqs

The **Undergraduate Certificate in Genetics** focuses on DNA at the core of life - how DNA works and how it informs the structures and functions of living things. The course explores key scientific advances and recent changes in our understanding of genetics. You will learn about medical and biotechnological breakthroughs and future possibilities including genome editing. The course explores the mechanisms by which genetic variation is created and how genes are passed from generation to generation.

As well as a broad introduction to the subject, the course aims to promote discussion about the current and future application of the Human Genome Project and genomic data in the medical field. Presentations are complemented by assignments and lab work. These give participants experience in data interpretation and presentation. The course includes a visit to the Sanger Institute and to a biotechnology company.

The **Undergraduate Certificate in Genetics** is designed as a natural complement to the Undergraduate Certificate in Evolutionary Biology, allowing students to explore both molecular and whole organism aspects of biology.

The course offers three termly units, and a syllabus and reading and resource list for each of these units is included in this course guide.

The course aims to:

1. show what DNA is at the molecular level and how it is read by the cellular machinery, how it is replicated, how it is maintained and mutated, and the implication of such mutations / changes for human health and diseases
2. introduce students to the core concepts of what genes are and how they work, enabling students to appreciate the transfer of genetic information in living cells
3. give insight into how genes are orchestrated and function together as part of the genome, what can go wrong and how they can be manipulated in the laboratory
4. detail key advances in modern genetic techniques and projects such as genome wide association studies and disease-risk prediction, the 1000 genomes project, gene therapy, and the use of stem cells
5. cover the principles of epigenetic control of gene expression and how this can go wrong in disease
6. explain how genetic material is passed from generation to generation and how this can influence the genetic structure of whole populations
7. discuss the theory of evolution and the evidence that supports it.

Transferable skills for further study and employability

- The capacity for independent thought and judgement
- The development of independent learning, study and time management skills
- The deployment of skills in critical reasoning
- The development of competence in using IT to support one's work
- The ability to work with others, productively and equitably
- The qualities necessary for employment requiring the exercise of some personal responsibility and the demonstration of high levels of motivation and personal commitment through part-time study
- The ability to reference sources of information to support one's reasoning

Study hours

The award of academic credit is a means of quantifying and recognising learning, and within the UK, one credit notionally represents 10 hours of learning[1]. Each of the units in this course attracts 20 credits so students should expect to need to study for approximately 200 hours in total to complete each unit successfully. However, it is recognised that students study at different paces and use a variety of approaches, so this is a recommendation, rather than a hard-and-fast calculation.

1 'Academic credit in higher education in England – an introduction'. The Quality Assurance Agency for Higher Education, 2009

Teaching staff

Course Director:

Dr Tom Monie is a protein biochemist with a long-standing interest in infection and immunity. He is a Fellow of Christ's College, University of Cambridge, where he also acts as a Tutor and the Director of Studies in Part 1A Biological Natural Sciences.

Tom's extensive experience in teaching within the University includes undergraduate supervisions, practical classes and lectures; he currently delivers the first year "Genes in Action" course for the Biology of Cells. Recent publication topics have included cat allergy - which was a global media story- Crohn's Disease, inherited auto-inflammatory genetic diseases, species variation in immunity and inflammation.

Many students have benefitted from his involvement in a wide range of teaching activities targeted at the provisions of subject-specific and transferable skills for graduate students. Tom is a firm believer that learning should be fun, that student participation is central to this process, and that successful teaching requires responsiveness to the needs of the students. He aims to instill these elements into his teaching and engagement activities.

Tutors

The course will be taught by a team of tutors whose expertise covers a wide range of different disciplines and a wealth of biological topics.

These include:

Dr Maya Ghoussaini completed a MSc degree in Gene Expression and Infectious diseases and PhD degree in Medical Genetics and Epidemiology at the Université de Lille II / Faculté de Médecine Henri Warembourg, France. During this period, she worked in the Pasteur Institute on the genetic susceptibility for childhood obesity and type 2 diabetes. In 2007, she was appointed as a Research Associate at the Department of Oncology at the University of Cambridge and a Postdoctoral Researcher at St Johns College, Cambridge. Her research focused on the genetic susceptibility of common cancers through identification of regions of the human genome involved in breast cancer development and the disease causative variants within these regions (genetic mapping). It also focused on how and why these genetic variants affect cancer susceptibility. Since 2017, she holds a Genetic Analysis Team Leader position at the Sanger Institute working on the Open Targets project where large-scale human genetics and genomics data are integrated to change the way drug targets for genetic diseases are identified and validated. She has also a particular interest in the Genetic Engineering field. Dr. Ghoussaini has a strong teaching interests and lectures on genetics as part of the MPhil course in Epidemiology and Public Health and has supervised undergraduate Part 1A students in the Natural Sciences Tripos (Mendelian Genetics, bacterial genetics, Physiology of Organisms).

Dr Leighton Dann is the Research and Development Officer for Science and Plants for Schools (SAPS), a charitable organisation within the University of Cambridge. Part of this job is to adapt some of the newer techniques of biochemistry and molecular biology, to enable them to be used in schools. He also runs workshops on these techniques for teachers and trainee teachers. Prior to this he taught Biology in a secondary school for a number of years. Even earlier, he conducted clinical research in the field of antenatal diagnosis of inherited metabolic diseases.

For a list of tutors who teach on the biological science programmes, please see the Biological and life sciences subject page on the Institute's website. (http://www.ice.cam.ac.uk/courses/courses-subject/biological-and-life-sciences

Administrative staff

Academic Programme Manager: Dr Liz Morfoot t. 01223 746226, emm30@cam.ac.uk

Programme Administrator: Ms Emily Wells t. 01223 746418, Emily.Wells@ice.cam.ac.uk

Venue

Madingley Hall is the University of Cambridge's campus dedicated to continuing education for adults. The magnificent Hall was built in the sixteenth century and acquired by the University in 1948. The Hall has been used by the Institute of Continuing Education as a venue since 1975.

You will be taught for part of the course in one of 14 classrooms at Madingley Hall where classrooms are arranged and equipped to encourage effective small group learning and peer interaction. Technology-enhanced learning, including lecture capture where appropriate, is used in many classes and wi-fi is available throughout the site. We also provide a range of social learning spaces which you can make use of before, or after, your class. Seven acres of superb gardens and grounds designed by Capability Brown provide space to think, reflect and relax. We offer a range of catering including formal dining, sandwiches and snacks, and

a full-service bar. If you are travelling a long distance you may wish to book accommodation in one of the Hall's 62 en suite bedrooms.

The Hall is situated three miles west of Cambridge with easy access from the M11 and the A14. There is ample free on-site car parking. Central London and Stansted Airport can be reached in under an hour by train from Cambridge railway station. Taxis from the railway station to Madingley Hall typically take around 20-25 minutes. Full directions are given on our website at: www.ice.cam.ac.uk/about-us/how-find-us

The other teaching venues are the Science Education Centre at Homerton College, Hills Road, Cambridge which offers excellent laboratory facilities and is situated at the back of the College site, beside the main car park; the Department of Pharmacology on 1 Tennis Ct Rd, Cambridge CB2 1QJ; and Strangeways Research Laboratory, Hills Road, Cambridge CB1 8RN. The Science Education Centre, the Department of Pharmacology, and Strangeways Research Laboratory are all within a 25 minute walk from Cambridge railway station.

Contact details of ICE

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Please also refer to the 'information for students' section on ICE's website www.ice.cam.ac.uk/studying-with-us/information-for-students and the 2017/18 Student Handbook for award-bearing courses for further information and guidance relating to all aspects of the course including study skills, assignments, assessment and moderation. The Course Information and Help and Guidance section of the ICE VLE will also contain valuable information specific to your course.

Information correct as at 16 August 2017

Syllabus for first unit

Michaelmas term 2017

DNA, the stuff our genes are made of

Start date	7 October 2017	**End date**	9 December 2017
Day	Saturday	**Time**	10.00am – 5.00pm
Venue	Madingley Hall, Madingley, Cambridge (7 October) Science Education Centre, Homerton College, Hills Road, Cambridge (21 October, 4 November, 11 November) Strangeways Research Laboratory, Hills Road, Cambridge (25 November)		
Course Director	Dr Tom Monie	**No of meetings**	Five Saturday day-schools on 7 and 21 October, 4, 11 and 25 November 2017

Aims

This unit aims to introduce the core concepts of what genes are and how they work, enabling students to appreciate the transfer of information from DNA to living cells. Practical work in the laboratory will enable students to observe cell structure and to appreciate at first-hand how DNA can be handled and manipulated in the laboratory. Consideration of DNA profiling will introduce students to an example of the application of specialised DNA techniques in modern society and associated ethical concerns.

Content

DNA molecules are at the core of life and they determine what we are. The DNA code is inherited from generation to generation and contains instructions for the development and life functions of all known organisms.

This unit examines the structure of DNA, from the initial experiments by Francis Crick and James Watson here in Cambridge in 1953, to our current understanding of the molecular machines that run our cells. We will consider how genes are co-ordinated and how they determine growth and development in organisms.

Our understanding of how genes work has developed rapidly, partly because DNA is particularly amenable to manipulation in the laboratory. The unit explains how scientists investigate gene activity and determine the molecular mechanisms involved. The discovery

and development of DNA profiling (fingerprinting) is considered as an illustration of an application of widespread significance arising from a programme of pure research.

Presentation of the unit

The five day-schools will consist of a mixture of lectures illustrated by Powerpoint and practical sessions, which will give students experience of laboratory work.

- Diagrams, models, video-clips and animations will be used to illustrate concepts and molecular mechanisms wherever possible.
- Discussion in class will facilitate an appreciation of the concepts and ethical issues of subjects under consideration.
- Laboratory days will involve practical bench work and data interpretation.

Provisional course structure

Date	Session	Venue	Indicative content
07/10/2017 10.00am – 5.00pm	Day-school one	Madingley Hall	This session provides an introduction to the course and a brief overview of its content. It discusses the use of DNA as the universal hereditary material and also introduces the process of evolution from the first life forms to the evolution of multicellularity. The day also includes study-skills sessions on essay writing, referencing and accessing scientific papers.
21/10/2017 10.00am – 5.00pm	Day-school two	Science Education Centre	This session describes the flow of information, from gene sequence to the protein product. It starts with exploring the DNA structure, its replication and how it is packed into chromosomes. This session ends with a 3 hour practical, exploring cell structure. **Assignment 1.**
04/11/2017 10.00am – 5.00pm	Day-school three	Science Education Centre	This session explores the transcription and translation processes. It is followed by a case study on DNA profiling and finishes with a description of mRNA splicing and the evolutionary advantage.
11/11/2017 10.00am – 5.00pm	Day-school four	Science Education Centre	This session explains the concept of mutations and the use of PCR as a technique in modern genetic research. It includes a hands-on practical that involves DNA extraction and handling (both from strawberries and from the students themselves). **Assignment 2 (first part).**
25/11/2017	Day-school five	Strangeways Research Laboratory	This lab session allows students to look at the genotyping and sequencing platforms currently used and they also learn how to read and interpret genotyping results. **Assignment 2 (second part).** The course finishes with a lecture on Next Generation Sequencing and

			genotyping and the students will have the opportunity to discuss the ethical and social issues related to DNA testing.

Learning outcomes

As a result of the unit, within the constraints of the time available, students should be able to:

- demonstrate an understanding of what genes are and how DNA sequence determines protein function;
- perform routine laboratory procedures to manipulate DNA with an understanding of the basic principles involved;
- demonstrate an understanding of the analysis and interpretation of experimental data in molecular biology.

Student assessment

The course requires a commitment to reading and pre-class preparation, including some specific reading between class sessions.

To help students get to grips with scientific terms and concepts, a workbook will be available to download from the VLE at the start of the course: this contains key words and concepts which the students are expected to define and discuss.

There is a large number of introductions to various aspects of genetics and students are recommended to select those of particular personal interest from the reading list. Background reading will greatly increase appreciation of the course.

There are two practical assignments associated with the unit and they are equally weighted:

Assignment 1: An essay discussing the transfer of information from DNA to the rest of the cell (2,000-2,500 words or equivalent)

Assignment 2: A scientific report of the DNA manipulation practical session, including details of the practical and interpretation of the data collected (1,000-1,500 words or equivalent).

All students are expected to upload their assignments into the VLE. Any assignments not suitable for uploading into the VLE will be clearly identified.

Closing date for the submission of assignments: **before 12 noon on Monday 8 January 2018 (GMT*)**
**Greenwich Mean Time*

Reading and resource list

AUTHOR	TITLE	PUBLISHER AND DATE
Alberts, Bruce et al	Essential cell biology (3rd Edition)	Garland Science 2009
Britannica	The Britannica guide to genetics	Robinson 2009
Brown, Terry	Gene cloning and DNA analysis: an introduction (6th Edition)	Wiley Blackwell 2010
Crick, Francis	What mad pursuit	The Penguin Press 1990
Dawkins, Richard	The blind watchmaker	The Penguin Press 2006
Griffiths, Anthony et al	Introduction to genetic analysis	W.H Freeman & Co 2007
Jones, Steven & Van Loon, Borin	Genetics for beginners (New Ed. 2000)	Icon Books 1993
Jones, Steven	The language of the genes	Flamingo 1994
Jones, Steven	In the blood, God, genes and destiny	Harper Collins 1997
Maddox, Brenda	Rosalind Franklin: The dark lady of DNA	Harper Collins 2003
Omoto, Charlotte & Lurquin, Paul	Genes and DNA: a beginner's guide to genetics and its applications	Columbia University Press 2004
Ridley, Matt	Genome: the autobiography of a species	HarperCollins 1999
Van Loon, Borin	DNA the marvellous molecule	Tarquin Publications 1991
Watson, James D	The double helix	The Penguin Press 1970
Watson, James D	DNA: the secret of life	Arrow Books Ltd 2004
Watson, James D	A Passion for DNA (essay collection)	Oxford University Press 2001
Watson, James D	Genes, girls and Gamow	Paperback, Oxford

Syllabus for second unit

Lent term 2018

From genes to genomes

Start date	13 January 2018	**End date**	24 March 2018
Day	Saturday	**Time**	10.00am – 5.00pm
Venue	Three day-schools are held at Madingley Hall, with the remaining day-school at the Department of Pharmacology, Cambridge		
Course Director	Dr Tom Monie	**No of meetings**	Four Saturday day-schools on 20 and 27 January, 3 and 17 February 2018

Aims

This unit explores some of the many areas of active whole genome research which followed on from the Human Genome Project and led to an unprecedented transformation in our biological understanding of human diseases and medical practices. We explain how genetic variation across the human genome is currently used to study susceptibility to common late-onset diseases. This unit also introduce epigenetics, its involvement in gene expression and how this can go wrong in disease. We finish with an introduction to stem cell biology and proposed stem cell therapy.

Content

The unit focuses on the Human Genome Project and the achievements that followed. We look at the technology developed and the current methods of researching genome data. We also introduce the rapidly growing field of 'bioinformatics' and discuss its impact on medical research and modern health care. We focus on the recent emergence of Genome-Wide Association Studies and the identification of new chromosomal regions associated with diseases. We explain how these findings are starting to shed light on defective biological process mechanisms at the cellular level and will briefly discuss their implications for healthcare through screening programs, early diagnosis, and personalised treatments.

This unit also gives an introduction to the fundamentals of epigenetic control and its crucial role in disease. We investigate how some genes are activated while others are silenced, and how is this controlled. The unit finishes with an introduction to stem cell biology and its use in regenerative medicine.

Presentation of the unit

The four day-schools consist of informal lectures illustrated by Powerpoint and practical sessions.

- Diagrams, models, video-clips and animations will be used to illustrate concepts and molecular mechanisms wherever possible.
- Discussion in class will facilitate an appreciation of the concepts being taught.
- Laboratory days will involve practical bench work and data interpretation.

Provisional course structure

Date	Session	Venue	Indicative content
20/01/2018 10.00am – 5.00pm	Day-school one	Madingley Hall	This first session provides an introduction to the second unit .It also explores the human genome project and the lessons learnt from it. The afternoon focuses on how to find disease genes and a practical exercise on how to use the HAPMAP and the 100 genomes resources. **Assignment 1.**
27/01/2018 10.00am – 5.00pm	Day-school two	Madingley Hall	This session explores Genome Wide Association Studies and how they are used to identify regions across the human genome that increase risk to diseases. It explains the current and future applications of genomics data **(Assignment 2)** and finishes with a discussion about the legal aspects of genetics and copywriting of genomes.
03/02/2018 10.00am – 5.00pm	Day-school three	Department of Pharmacology	This session begins by discussing how genetics and genomics are used to unravel the cancer genomes. It also discusses how normal and cancer cells are grown in the lab and genetically edited to understand their behaviour and characteristics.
17/02/2018 10.00am – 5.00pm	Day-school four	Madingley Hall	This session starts with a lecture on ‘Clinical genome sequencing’. It will be followed by an introduction to the fundamentals of epigenetics and its role in diseases. This day-school will end by discussing stem cells and their therapeutic applications.

Learning outcomes

As a result of the unit, within the constraints of the time available, students should be able to:

- show they have considered the value of the information generated by the Human Genome Project and how it has aided our understanding of human genetics and disease;
- demonstrate an understanding of how large datasets, such as HAPMAP/1000 Genomes Project, can be used and interpreted;

- demonstrate an understanding of the use of stem cells in medicine.

Student assessment

The course requires a commitment to reading and pre-class preparation, including some specific reading between class sessions.

There is a large number of eminently readable introductions to various aspects of genetics and students are recommended to select those of particular personal interest from the reading list. Selected background reading will greatly increase appreciation of the course.

There are two practical assignments associated with this unit and they are equally weighted:

Assignment 1: An essay discussing how the Human Genome Project has advanced our understanding of human genetics and human disease (1,500 – 2,000 words).

Assignment 2: A scientific report of the HAPMAP/1000 Genomes Project practical session, including interpretation of the data collected (1,500 – 2,000 words).

Scientific papers selected within the main topics covered during the course will be sent to course participants.

All students are expected to upload their assignments into the VLE. Any assignments not suitable for uploading into the VLE will be clearly identified.

Closing date for the submission of assignments: **before 12 noon on Monday 16 April 2018 (BST*)**

**British Summer Time*

Reading and resource list

AUTHOR	TITLE	PUBLISHER AND DATE
Alberts, Bruce et al	Essential cell biology (3rd Edition)	Garland Science 2009
Hartl, Daniel L	Essential Genetics: a genomics perspective (6th Edition)	Jones & Bartlett 2012
Jones, Steven & Van Loon, Borin	Genetics for beginners	Icon Books 2000
Jones, Steven	The language of the genes	Flamingo 1994
Jones, Steven &	Introducing genetics	Icon 2005

Van Loon, Borin		
King, Robert C	A dictionary of genetics (7th Edition)	OUP 2006
Klug, William et al.	Essentials of genetics (7th Edition)	Pearson 2009
Ridley, Matt	Genome: the autobiography of a species in 23 chapters	Fourth Estate 2000
Scherer, Stewart	A Short Guide to the human genome	Cold Spring Harbor Laboratory Press
2008		
Scott, Chistopher T	Stem cell now: A brief introduction to the coming medical revolution	Penguin 2007
Van Loon, Borin	DNA the marvellous molecule	Tarquin Publications 1991
Venter, Craig	A life decoded: my genome my life	Penguin 2008
Watson, James D	The double helix	The Penguin Press 1970

Syllabus for third unit

Easter term 2018

Genetics: past, present and future

Start date	21 April 2018	**End date**	2 June 2018
Day	Saturday	**Time**	10.00am – 5.00pm
Venue	Madingley Hall, Madingley, Cambridge (21 April and 2 June) Science Education Centre, Homerton College, Hills Road, Cambridge (5, 12 and 26 May)		
Course Director	Dr Tom Monie	**No of meetings**	Five Saturday day-schools on 21 April, 5, 12 and 26 May and 2 June 2018

Aims

This unit discusses the theory of evolution and the evidence that supports it. It also introduces the science behind the inheritance of specific characteristics, by considering how genes are passed on from generation to generation. Our aim is to promote an understanding of the mechanisms of inheritance in families and then an appreciation of the distribution of variation within populations and the interaction between genes and the environment.

This unit also discusses the potential of genetic manipulation and examines the benefits and dangers of manipulating the human genome and human reproductive processes through gene therapy.

Content

This unit explains how genetic variation is generated, passed on in families and distributed among populations. The diversity of gene frequencies in different populations are investigated with examples of the effects of chance, selection and migration.

The unit also centres on the techniques and applications of genetic technologies, how we can copy genes, move them around, and some of the rapid sequencing techniques developed through modern genomics. Teaching sessions cover the particular issues of genetically modified organisms, genetic diseases and gene therapy.

Presentation of the unit

The five day-schools will consist of informal lectures illustrated by Powerpoint and practical sessions.

- Diagrams, models, video-clips and animations will be used to illustrate concepts and molecular mechanisms wherever possible.
- Discussion and group-working in class will facilitate an appreciation of the concepts being taught.
- Laboratory days will involve practical bench work and data interpretation.

Provisional course structure

Date	Session	Venue	Indicative content
21/04/2018 10.00am – 5.00pm	Day-school one	Madingley Hall	This day-school starts by discussing the theory of evolution and the evidence that supports it. We go on to discuss how genetic variations are generated and passed on in families and distributed among populations and how genes and environment interact with each other. There is an opportunity to discuss the previous assignment and feedback. **Assignment 1**.
05/05/2018 10.00am – 5.00pm	Day-school two	Science Education Centre	This session explores the Y chromosome and the mitochondrial DNA and is followed by a lecture on tracing human migration. We end with student presentations on a variety of research topics.
12/05/2018 10.00am – 5.00pm	Day-school three	Science Education Centre	This session includes a three-hour practical on bacterial transformation and applications of Green Fluorescent Protein. **Assignment 2**. We end with student presentations on a variety of research topics.
26/05/2018 10.00am – 5.00pm	Day-school four	Science Education Centre	This session discusses the potential of genetic manipulation and examines the benefits and dangers of manipulating the human genome and human reproductive processes through gene therapy. It also includes a follow-up practical, focussed on protein separation.
02/06/2018 10.00am – 5.00pm	Day-school five	Madingley Hall	This last session explains how researchers generate gene knockout and transgenic mouse models and their crucial use in the study of diseases. We end with student presentations on a variety of research topics and a summing up of the course.

Fieldtrips

This course also involves a fieldtrip to visit Illumina OR the Sanger Centre, both of which are located about 15 miles out of Cambridge. A date for this visit will be confirmed closer to the

time of the trip and usually take place towards the end of the Lent term or during the Easter term.

Learning outcomes

As a result of the unit, within the constraints of the time available, students should be able to:

- demonstrate an understanding of genes, chromosomes and the principles of Mendelian inheritance;
- demonstrate an understanding of the mechanisms by which variation is generated at meiosis;
- demonstrate a knowledge of the inheritance and underlying causes of genetic traits and diseases, including the interplay of genes and the environment.
- demonstrate an understanding of the techniques employed in genetic manipulation

Student assessment

The course requires a commitment to reading and pre-class preparation, including some specific reading between class sessions.

There is a large number of eminently readable introductions to various aspects of genetics and students are recommended to select those of particular personal interest from the reading list. Selected background reading will greatly increase appreciation of the course.

There are two assignments associated with the unit and they are weighted equally:

Assignment 1: An essay discussing the interaction between genes and the environment (1,500-2000 words).

Assignment 2: A write up of the bacterial transformation practical session (1,500-2,000 words or equivalent).

All students are expected to upload their assignments into the VLE. Any assignments not suitable for uploading into the VLE will be clearly identified.

Closing date for the submission of assignments: **before 12 noon on Monday 25 June 2018 (BST)**

Reading and resource list

AUTHOR	TITLE	PUBLISHER AND DATE
Hartl, Daniel L	Essential Genetics: a genomics perspective (6^{th} Edition)	Jones & Bartlett 2012
Gonick, Larry	The cartoon guide to genetics	Harper Perennial 1992

Gregory, Jennifer	Applications of genetics	Cambridge University Press 2000
Jenkins, Morton 1998	Genetics	Teach Yourself Books
Jones, Steven	Y: the descent of man	Little, Brown 2002
Jones, Steven	In the blood	Harper Collins 1995
Jones, Steven	The language of the genes	Flamingo: London 1994
Mange, Elaine J & Mange, Arthur P	Basic human genetics	Sinauer Associates 1999
Oppenheimer, Stephen	Out of Eden, the peopling of the world	Constable 2003
Ridley, Mark	Mendel's demon	Phoenix 2000
Ridley, Matt	Genome: the autobiography of a species in 23 Chapters	Fourth Estate 2000
Ridley, Matt	Nature via nurture	Fourth Estate 2003
Wells, Spencer	The journey of man: a genetic odyssey	Penguin 2002

TIMETABLE

Michaelmas 2017: **DNA, the stuff our genes are made of**	
Day-school 1	7 October 2017
Day-school 2	21October 2017
Day-school 3	4 November 2017
Day-school 4	11 November 2017
Day-school 5	25 November 2017
Lent 2018: **From genes to genomes**	
Day-school 1	20 January 2018
Day-school 2	27 January 2018
Day-school 3	3 February2018
Day-school 4	17 February 2018
Easter 2018: **Genetics: past, present and future**	
Day-school 1	21 April 2018
Day-school 2	5 May 2018
Day-school 3	12 May 2018
Day-school 4	26 May 2018
Day-school 5	2 June 2018

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Assignment submission dates are normally 3 weeks after final teaching session of term.

Whilst every effort is made to avoid changes to this programme, published details may be altered without notice at any time. The Institute reserves the right to withdraw or amend any part of this programme without prior notice.