

## Global Learning Semesters

### Course Syllabus

Course: BIOL-230 Human Molecular Genetics

Department: Health and Life Sciences

Host Institution: University of Nicosia, Nicosia, Cyprus



Course Summary		
Course Code	Course Title	Recommended Credit Hours
BIOL-230	Human Molecular Genetics	3
Semester Offered	Contact Hours	Prerequisites
Please contact us	42-45	BIOL -101, BIOL -102
Department	Level of Course	Language of Instruction
Health and Life Sciences	Lower Division	English

### Course Description

The course integrates the latest data from the Human Genome Project with emphasis on cells and development and on functional genomics, proteomics and bioinformatics. The course emphasizes gene function, the relationship between chromosomes and genes and the mechanisms of inheritance via gene recombination, complementation etc. It covers Mendelian and non-Mendelian inheritance and how comparative analysis of present day genomes have helped us understand aspects of the evolutionary origin of human DNA, its organization and of complex genetic diseases. The student is also introduced to the applications of genetic knowledge, the methods for tracking Mendelian inherited genetic traits and human genetic disorders as well as to ethical issues related to gene and human cloning. The format of the course will be 3 h lectures and one hour tutorials per week.

### Prerequisites

BIOL -101, BIOL -102

### Topic Areas

1. Mendelian pedigree patterns and nonmendelian characters
2. The human chromosomes and Medical Genetics (Cytogenetics).
3. DNA/RNA technology in the study of human genetics
4. The genome project
5. Organization of the human genome; human gene expression.
6. Instability of the human genome: mutation and DNA repair
7. Physical and genetic mapping of mendelian characters and of complex human genetic disorders
8. The sex gene chromosomes
9. Molecular pathology of genetic diseases: genetic manipulation of animals
10. Genetic testing in individuals and populations
11. Cancer genetics; human genome epidemiology
12. Gene cloning
13. Molecular medicine; gene therapy applications
14. Cloning and Bioethics

### Tutorials

Through 1 hour tutorials. The student learns about tracking of genes and population screening data and is trained how to access information about DNA/protein sequences and the relevant scientific literature for any particular gene

and its product through web-based databases and software. Population Genetics and human genetic disorders are discussed through data exercises, case studies presentation and the relevant literature.

#### Data Bases

1. The National Center for Biotechnology Information: <http://www.ncbi.nlm.nih.gov/>
2. Genome Database: <http://www.gdb.org/>
3. Medline: <http://www.ncbi.nlm.nih.gov/pubmed/>
4. Online Mendelian Inheritance in Man (OMIM)
5. USA: <http://www.ncbi.nlm.nih.gov/omim/>
6. UK: <http://www.hgmp.mrc.ac.uk/omim/>
7. GeneBank (DNA and protein sequences): <http://www.ncbi.nlm.nih.gov/>
8. EMBL databank (DNA sequences): <http://www.ebi.ac.uk/>

### Readings and Resources

#### Required Textbooks

1. Human Molecular Genetics, Third Edition by Tom Strachan, Andrew Read Publisher: Garland Science/Taylor & Francis Group; 3rd edition (December 1, 2003) ISBN: 0815341822

#### Recommended Textbooks

2. Principles of Genetics W/Genetics: From Genes to Genomes CD-ROM and Website Password Card, Seventh Edition Author: Robert H. Tamarin, Publishers: McGraw Hill, 2001, ISBN: 0-07-248523-X
3. Thompson & Thompson Genetics in Medicine by Robert L., Md. Nussbaum, Roderick R., Md., Ph.D. McInnes, Huntington F., Ph.D. Willard, Margaret W. Thompson Thompson, Thompson Genetics in Medicine Thompson, W. B. Saunders Publisher: W B Saunders; 6th edition (August 2001) ISBN: 0721669026
4. Mendelian Inheritance in Man by McKusick V.A. (1997) 12<sup>th</sup> edn. John Hopkins University Press, Baltimore
5. Principles of Medical Genetics by Thomas D., Md. Gelehrter, Francis S., Md. Ph.D. Collins, David, Md. Ginsburg, Thomas F. Gelehrter Publisher: Lippincott, Williams & Wilkins; 2nd edition (January 15, 1998) ISBN: 0683034456
6. Color Atlas of Genetics (Thieme Flexibook) by Eberhard, MD Passarge Publisher: Thieme Medical Publishers; 2nd edition (March 15, 2001) ISBN: 0865779589
7. Molecular Biology of the Gene, Fifth Edition by James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick Publisher: Benjamin Cummings; 5 edition (December 3, 2003) ISBN: 080534635X
8. Human Genome Epidemiology: A Scientific Foundation for Using Genetic Information to Improve Health and Prevent Disease (Monographs in Epidemiology and Biostatistics) by Muir J., Ph.D. Khoury, Wylie, Ph.D. Burke, Julian, Ph.D. Little Publisher: Oxford University Press (October 1, 2003) ISBN: 0195146743
9. The Human Embryo Research Debates: Bioethics in the Vortex of Controversy by Ronald M. Green Publisher: Oxford University Press (July 1, 2001) ISBN: 0195109473
10. The Epigenome : Molecular Hide and Seek by Stephan Beck (Editor), Alexander Olek (Editor) Publisher: Wiley-VCH (April 22, 2003) ISBN: 3527304940
11. Genomics: Applications in Human Biology by Sandy B. Primrose, Richard M. Twyman, S. B. Primrose Publisher: Blackwell Publishers (February 1, 2004) ISBN: 1405108193
12. Your Future Self: A Journey to the Frontiers of Molecular Medicine by Hank Whittemore Publisher: Thames & Hudson (November 1, 1998) ISBN: 0500542236
13. Molecular Biotechnology: Therapeutic Applications and Strategies by Sunil Maulik, Salil D. Patel Publisher: Wiley-Liss; 1st edition (January 15, 1997) ISBN: 0471116815
14. The Molecules Within Us: Our Body in Health and Disease by Charles A. Pasternak Publisher: HarperCollins Publishers (October 1, 1998) ISBN: 0306459876
15. Human Evolutionary Genetics: Origins, Peoples & Disease by Mark A. Jobling, Matthew Hurles, Chris Tyler-Smith, MARK JOBLING Publisher: Garland Science/Taylor & Francis Group (December 1, 2003) ISBN: 0815341857
16. The Genetic Basis of Human Cancer by Bert Vogelstein, Kenneth W. Kinzler Publisher: McGraw-Hill Professional; 2 edition (March 19, 2002) ISBN: 0071370501

17. Molecular Biology of the Cell, Fourth Edition by Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walt Publisher: Garland Science; 4th Bk&Cdr edition (March, 2002) ISBN: 0815332181
18. Human Molecular Genetics, Third Edition by Tom Strachan, Andrew Read Publisher: Garland Science/Taylor & Francis Group; 3rd edition (December 1, 2003) ISBN: 0815341822
19. DNA : The Secret of Life by JAMES D. WATSON, ANDREW BERRY Publisher: Knopf; 1st edition (April 1, 2003) ISBN: 0375415467
20. Analysis Of Multifactorial Diseases (Human Molecular Genetics) by T. Bishop, P. Sham, PAK SHAM, D. TIMOTHY BISHOP Publisher: BIOS Scientific Publishers (September 1, 2000) ISBN: 1859961134