The Hebrew University of Jerusalem

Syllabus

Introduction to sciences and analytical methods in forensic sciences (biology) - 61926

Last update 05-02-2019

HU Credits: *2*

Degree/Cycle: 2nd degree (Master)

Responsible Department: Criminology

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Prof. Abraham Domb and Dr. Merav Darash-yahana

Coordinator Email: [*avid@ekmd.huji.ac.il*](mailto:avid@ekmd.huji.ac.il)

Coordinator Office Hours: by appointment e-mail

<u>Teaching Staff:</u>
  Prof Abraham Domb
Dr. Merav Darash-yahana

<u>Course/Module description:</u>
  Course description: Introduction to sciences and analytical methods in forensic sciences– Biology- is a basic course in biology that will teach basic methodologies and terminologies in biology including the structure of the cell and its organelles and the structure of the genetic material. The process of transcription from DNA to RNA and translation from RNA to protein. An introduction to basic genetics will be given – dominant and receive traits, homozygote, heterozygote, genotype and phenotype. Sexual vs. asexual reproduction. Cell division – meiosis vs. mitosis. Chromosomes, gens and alleles. The Mendel's laws – law of independent assortment of chromosomes, law of segregation of alleles. Sex chromosomes XY, and genetic disorders X or Y linked. Punnett squares and pedigree analysis. Nuclear vs. mitochondrial DNA inheritance. Blood type inheritance A, B, AB, O. Mutation in DNA and genetic disorders. Methodologies of DNA analysis used in forensic science – PCR, RFLP, STR. What are enzymes and how do they work. In addition an introduction to basic immunology will be given– the innate and adaptive immune systems. What are the cell types in the immune system? What are antigens, epitopes and receptors? How are antibodies produced in the body? What are monoclonal vs. polyclonal antibodies? In the end of the course students will understand basic biological terminologies that are necessary to understand the methodologies used in forensic science.

<u>Course/Module aims:</u>
  Course aims is to instill in the participants of the course basic knowledge in biological science on which the methods of comparison and identification are based on in forensic science. The course is composed of 13 lessons in the subjects of introduction to science and methods of forensics science

<u>Learning outcomes - On successful completion of this module, students should be able to:</u>
  On successful completion of this module, students should be able to understand Basic methodologies and terminologies in science:
The structure of the cell, cell organelles, nucleus, mitochondria, ribosomes. The structure of the genetic material, chromosomes, DNA, RNA. Structure of proteins, polypeptides, amino acids. "The central Dogma of biology" – transcription from DNA to RNA, Translation from RNA to protein. Three types of RNA (mRNA, tRNA, rRNA). The Genetic code –from codon to amino acid. Introduction to Basic genetics – dominant and receive traits, homozygote, heterozygote, genotype and phenotype. Sexual vs. asexual reproduction. Cell division – meiosis vs. mitosis. Chromosomes,

gens and alleles. The Mendel's laws – law of independent assortment of chromosomes, law of segregation of alleles. Punnett squares analysis. Variations on Mendel laws – co-dominance of traits. Sex chromosomes XY, and genetic disorders X or Y linked. Pedigree analysis. Nuclear vs. mitochondrial DNA inheritance. Blood type inheritance A, B, AB, O. Mutation in DNA and genetic disorders. Methodologies of DNA analysis used in forensic science – PCR, RFLP, STR. Proteins, Enzymes, restriction enzymes, energy of activation. Introduction to basic immunology – the innate and adaptive immune systems. Cell types in the immune system – T, B, plasma cells. Antigens, epitopes and receptors. Production of Antibodies. Monoclonal and polyclonal antibodies.

<u>Attendance requirements(%):</u>
  Attendance required 80%

Teaching arrangement and method of instruction: Lectures will be given in Hebrew with presentation that will be uploaded to Moodle.
All presentations are mostly written in English

<u>Course/Module Content:</u>
  1. 19.3.2018 - Introduction to forensic biology.
2. 26.3.2018- Structure of the cell, cell organelles, nucleus, mitochondria, ribosomes. Structure of the genetic material, chromosomes, DNA, RNA.
3. 9.4.2018 - "The central Dogma of biology" – transcription from DNA to RNA. Translation from RNA to protein. The Genetic code –from codon to amino acid.
4. 16.4.2018 - Introduction to Basic genetics- Chromosomes, gens and alleles. Sexual vs. Asexual reproduction. Cell division – meiosis vs. mitosis. Dominant and receive traits, homozygote, heterozygote, genotype and phenotype.
5. 23.4.2018- The Mendel's laws – law of independent assortment of chromosomes, law of segregation of alleles. Punnett squares analysis. Variations on Mendel laws – co-dominance of traits.
6. 30.4.2018- Sex chromosomes XY, and genetic disorders X or Y linked.
7. 7.5.2018 - Pedigree analysis. Nuclear vs. mitochondrial DNA inheritance. Blood type inheritance A, B, AB, O. Mutation in DNA and genetic disorders.
8. 21.5.2018 - Proteins, Enzymes, energy of activation.
9. 28.5.2018 - Methodologies of DNA analysis used in forensic science –restriction enzymes, gel electrophoresis, PCR.
10. 4.6.2018- Methodologies of DNA analysis used in forensic science – RFLP, STR.
11. 11.6.2018- Introduction to basic immunology – the innate and adaptive immune systems. Cell types in the immune system – T, B, plasma cells.
12. 18.6.2018 - Introduction to basic immunology- Antigens, epitopes and receptors. Production of Antibodies. Monoclonal and polyclonal antibodies.

13. 25.6.2018 – Summary of course

Required Reading:
 Will be given during the course

 Additional Reading Material:
  Introduction to genetic analysis. Anthony JF, Griffiths, 10th or 11th Edition.

 Course/Module evaluation:
 End of year written/oral examination 100 %
 Presentation 0 %
 Participation in Tutorials 0 %
 Project work 0 %
 Assignments 0 %
 Reports 0 %
 Research project 0 %
 Quizzes 0 %
 Other 0 %

Additional information:
  Exam - multiple-choice test and/or free questions