Viruses & How to Beat Them: CELLS, IMMUNITY, VACCINES

Prof. Jonathan M. Gershoni

(תשב"ד 1882-0413)

This course is an online course primarily on edX. It offers a unique learning experience allowing students to learn at their own pace and includes a variety of learning methods: recorded short lectures, reading materials from primary and secondary sources, and discussion questions.

The course is offered in English and the videos are accompanied by writings in Hebrew or Arabic. Additional course materials (questions within the videos, reading materials, discussions, and tests) are in Hebrew.

The course is worth 2学分 at Tel Aviv University. At the end of the viewing period, questions are integrated with immediate feedback. In addition, the "Quiz" – which is not included in the grade – is recommended for practice and familiarization.

The final exam is a 100%-objective final exam – the questions are written in both languages and the student can answer in Hebrew or English, as chosen.

The exam that determines the final grade in the course is an objective final exam and comprises 100%.

The course covers the following topics:

- The Introduction to Biology of the Cell
  - Life in general – the role of water and its properties as the main component
  - Elements and compounds and the periodic table
  - The cell as a unit of life
  - Chemistry of life – sugars, fats, amino acids, and the building blocks of DNA
  - Transporting information in the cell – making proteins
  - Transmission of information and metabolic processes
  - Molecules and proteins – the building blocks of life

Ozlem Bektin

תל אביב
03-6407174
core@tau.ac.il 03-6407584 6997801
www.core.tau.ac.il
www.coex.tau.ac.il

אנונימיסציה: אניב פרידל
כדאי북ו: מזכירה את היהודי
0012-1335
03-6407174
core.tau.ac.il
Lesson 1: Cells are the Units of Life
- Life is More Than Just Being Alive
- Measuring the Physical World in Units
- Atoms, Chemical Elements, the Periodic Table
- From Leeuwenhoek to Schleiden & Schwann - the “Cell Doctrine”
- Cells – the Units of Life
- Inanimate vs Organic Chemistry
- Water and Hydrogen Bonds
- Sugars, Lipids and the Cell Membrane
- Cell Organelles

Lesson 2: Macromolecules – from DNA to Proteins
- The Structure of Linear Polymers
- Condensation and Hydrolysis Reactions
- DNA – the Discovery that DNA is the Stuff Genes are Made of.
- Nucleotides: Structure and DNA Composition – Chargaff's Rules
- The Double Helix – Discovery and Structure
- Semi-Conservative DNA Replication
- Information Flow - From DNA to Proteins
- Amino Acids and the Polymeric Structure of Proteins
- The Genetic Code
- Ribosomes - Translating RNA to Proteins
Lesson 3: Viruses: Structure, Function, Infection & Replication

- Non-Contagious (Non-Communicable) Diseases – (NCDs)
- Getting Rid of Damaged Proteins via the Ubiquitin/Proteasome System
- Pathogens and Infectious Disease
- Discovering Infectious Agents - Koch's Postulates
- Viruses: Structure and Function
- Classification of Viruses
- Tissue Culture and the Study of Viruses
- Cytopathic Effects - CPE
- Viruses: Infection and Replication

Lesson 4: Human Viral Diseases

- Modes of Virus Transmission
- Smallpox
- Yellow Fever
- Ebola Hemorrhagic Fever
- Influenza
- Polio
- Why and How Epidemics Emerge

Lesson 5: Innate Immunity - Our First Line of Defense

- The Anatomy and Cells of Our Immune System
- Phagocytes and Lymphocytes
- Physical and Chemical Barriers: Skin and the Mucosa
- Mucus and Lysozyme
- Fleming's Discovery of Penicillin
- Macrophages and Pathogen Recognition: PRRs and PAMPS
- Inflammation: Redness, Swelling, Heat and Pain
- How the Microbiome Participates in Innate Immunity
- Innate vs Adaptive Immunity

Lesson 6: Adaptive Immunity: Knocking Out the Enemy

- B-Cell Immunity: Antibodies Structure and Function
- How Antibodies Neutralize Viruses
- T-Cells and the MHC Reporting System
- IgE - Mast Cells and Fighting Worms and Allergy
- Immunodeficiency: Malnutrition, SCID and AIDS
- The Importance of Blood Tests and How They Work
Lesson 7: Vaccines – How They Work: Pros & Cons

- Vaccination – Basic Principles
- Eradication of Smallpox
- Live and Killed Polio Vaccines
- Subunit Vaccines
- Vaccine Challenges for the Future
- Pros and Concerns about Vaccines
- The Vaccine Schedule: Composition and Considerations