Title of the course: Biology I.	***NEPTUN-code:*** RKXBI1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:* tm
Course leader: Hosam Bayoumi, Dr.	***Position:*** university private professor, associate professor	***Required preliminary knowledge:*** None	

Curriculum:

What is life? Fundamental of biology: life science. Organization levels of life. Characteristics of living organisms. Modern and molecular biology. Biopolymers in living organisms: carbohydrates, lipids, protein, and nucleic acids. Basics of classification of living organisms. Cell Biology: Cell definition, structures and functions. Homeostasis and cell transport. Photosynthesis: Definition, chloroplast structure and function, structure and function of photosystems. Cellular respiration: Biochemical reactions and enzymes, Catabolic and anabolic pathways. Adenosine triphosphate: Chemiosmosis, synthesis and production. Cellular reproduction: Cell cycle, Cell division (mitosis and meiosis). Fundamentals of molecular genetics, DNA, RNA and protein synthesis, gene expression: Chromosome and gene structure and function, inheritance patterns and human genetics, gene technology (DNA technology, human genome projects, genetic engineering). DNA replication. Types of RNA and protein synthesis: Transcription, translation and gene control. Mutation: types, prevalence and significance. Plasmids: their role and adaptation. Microorganisms, protists and fungi. Bacteria (Characteristics and classification, non-cell wall bacteria, cyanobacteria and archaea, bacterial size and shape, and roles of bacterial activities in the environment and industry). Viruses (Characteristics, structure and classification). Characteristics and classification of Protista. Plant and animal-like protists. Protists and human. Biology of algae and roles of algae in the environment. Fungi: Characteristics and classification and their importance in nature and industry. Microbial cultivation and growth: Physical and chemical growth requirements, cultivation and isolation techniques. Microbial growth and reproduction: Growth curve, reproduction patterns and microbial measurements. Control of microbial growth: Physical and chemical methods. Antibiotics, mode of action, antimicrobial drugs and drug resistance. Microbial Ecology: energy transfer and ecosystem management, microbe-microbe, microbe-plant and microbe-animal interactions.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection

Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.

Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Sharing experiences with colleagues, thus promoting their development.

Taking responsibility towards society for their decisions made in the scope of environment protection.
Literature:
• Lecture's notice and PPT
• Richard Hunt et al. (2011): Microbiology and Immunology On-line. The Board of Trustees of the University of South Carolina
• J.H. Postlethwait and J.L. Hopson (2009): Modern Biology. Holt, Rinehart and Winston. A Harcourt Education Company, New York, London. ISBN-13: 978-0-03-006769-4
• Kenneth Todar (2008): Todar's Online Textbook of Bacteriology. University of Wisconsin
• David M. Sander (2007): Big Picture Book of Viruses.
• Julie B. Wolf (2005): Applied Molecular Biology. Beginning Laboratory Manual. University of Maryland, Baltimore County (UMBC).
• T. A. Brown (2002): Genomes 2nd edition Bios Scientific Publishers Ltd IBSN: 9781859962282
• Harry L. T. Mobley, George L. Mendz, Stuart L. Hazell (2001): Helicobacter pylori: Physiology and Genetics. ASM Press ISBN: 9781555812133
• Madigan, Martinko and Parker (2000): Biology of Microorganisms. 8th edition Southern Illinois University, Carbondale
Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay. Term marks: 85-100%: excellent (5), 75-84%: good (4), 65-74%: satisfactory (3), 50-64%: pass (2), 0-49%: fail (1).