**II.2.11 FUNDAMENTAL AND APPLIED MICROBIOLOGY**

1. **Course description:**
2. **Credit points**: 4 ECTS
3. **Time commitment:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Items | Lecture | Tutorial/  Exercise | Practice/  Assignment | Lab-work | **Total** |
| No. of hours | 30 | 2 |  | 8 | **40** |

1. **Prerequisites**:

* Students can not be absent for more than 20% of lectures and practices

1. **Recommended background knowledge**:

Fundamental Genetic, Fundamental Biochemistry.

1. **Subject description:**

Provides foundations of microbiology for students including all major groups of microorganism viruses, bacteria, fungi, algae, and protozoa, the relationships of microorganisms to other organisms, human being and the environment.

Introduces students to current microbiological applications in research and industry.

1. **Objectives & Outcome:**

After the course the students will have principal knowledge of:

* The microbial cell structure and function, microbial metabolism, genetic and reproduction.
* Control of microorganism by physical and chemical agents.
* The relationships of microorganisms to other organisms, human being and the environment.
* The applications of microorganism in food industry, solvent production, some medicines production and other products
* The use of microorganism in biodegradation
* Some biotechnological applications: Microbial recombinant DNA technology, Biosensors, Microarrays, Biopesticides.

Students are also provided with basic microbial laboratory techniques

1. **Assessment/ Evaluation:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Component | Attendance | Exercises | Assignments | Reports | Midterm | Final |
| Percentage % |  |  |  | 20 | 30 | 50 |

1. **Prescribed Textbook(s):**

[1] Lansing M. Prescott, John P. Harley, Donald A. Klein, *Microbiology*, Fifth Edition 2002, McGraw-Hill Publishers

[2] John P. Harley and Lansing M. Prescott, *Laboratory Exercises in Microbiology*, Fifth Edition 2002, McGraw-Hill Publishers

1. **Course content & schedule:**

1 - Introduction to microbiology

- Prokaryotic cell organization

2 - Eukaryotic cell organization

- Microbial nutrition

- Microbial growth

3 Microbial metabolism

4 Genetics of bacteria

5 The Fungi, Algae and Protozoa

6 The Viruses

7 Human diseases caused by Viruses, Bacteria, Fungi and Protozoa

8 - Microbial evolution and the role of microorganisms in ecosystem

- Exercises and tutorials

9 - Control of microorganisms

- Middle term examination

10 Classical biotechnology

- Food production

- Industrial microbiology

11 Products of the primary metabolism

12 Products of the secondary metabolism

13 Biodegradation and bioremediation

Exercises and tutorials

13 Culture media, solution and instruments preparation and sterilization

14 Simple staining and Gram stain, Microscopy (observing microbes)

15 Isolation, cultivation and storage of microorganism (Examination of a sample for microbes)

16 - Starch Hydrolysis, Casein Hydrolysis

- Antibiotic assays

- Skin microbes

1. **Reference Literature:**

[1]. Lansing M. Prescott, John P. Harley, Donald A. Klein 2002, Microbiology, Fifth Edition, McGraw-Hill Publishers

[2]. John P. Harley and Lansing M. Prescott 2002, Laboratory Exercises in Microbiology, Fifth Edition, McGraw-Hill Publishers

[3]. Alexander N. Glazer, Hiroshi Nikaido 2007, Microbial Biotechnology - Fundamentals of Applied Microbiology, Second Edition, Cambridge University Press

[4]. Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton 2001, Industrial Microbiology:

An Introduction, Blackwell Science Ltd

[5]. Madigan M.T., Martinko J.M., Dunlap P.V. and Clark D.P., “Brock - Biology of Microorganisms", Pearson 2009