COURSE ID SHEET

Course No.	5232	NTUA

Semester:	5	Core	X	Elective		Specialization	

Title: **PRINCIPLES OF CELL BIOLOGY AND BIOCHEMISTRY**

Aim:

The purpose of the course is to give students of the School of Chemical Engineering a concise, brief but accurate and in-depth presentation of the basic concepts of cell biology, but it also includes a taste of the latest scientific findings to stimulate curiosity and interest of students. The book provides the basis for molecular understanding, how the cell works, how it uses and produces energy, how it retains its structure, how it recognizes and processes messages, how it propagates. This basic knowledge is the foundation for the development and understanding of modern biotechnology.

Content:

The content of the course is divided into three main topics. In the first section:

- Eukaryotic cells and their organelles, the similarities and varieties of eukaryotic and bacterial cells, as well as the standard organisms used for the research of biological problems and applications.
- Cell molecules, amino acids, nucleic acids, lipids, etc., as well as the types of bonds with which macromolecules interconnect.
- How cells use energy, oxidation and reduction of molecules, basic concepts of enzyme catalysis, free energy release, and determining the direction of chemical reactions as well as activated carrier molecules involved in biosynthesis.
- How cells get energy from the degradation of sugars and lipids, how it regulates and organizes the metabolism and in what form the foods are stored.

The second section deals with:

- The structure and properties of DNA, the mechanism of DNA replication, the changes that DNA undergoes by mutations and other causes, and the mechanisms of DNA repair.
- The transcription of DNA into RNA, the sewing of RNA to mRNA, the mechanism of protein synthesis, and the role of RNA in the origins of life as an information molecule and an enzyme.

The third section describes the structure and function of the remaining cellular elements:

- The structure of the lipid bilayer of cell membranes and the membrane proteins incorporated or membrane permeate.
- The membrane function and its permeability to ions and other molecules with active and passive transport, the various types of ion channels and the way they are controlled, the generation of membrane potential, as well as the function of the ionic channels of the nerve cells; and their role in signaling.
- Detailed structure and function of mitochondria and energy production during oxidative phosphorylation, structure of chloroplasts and energy production during photosynthesis, as well as the origin of mitochondria and chloroplasts are described.

Hours per semester:									
	LECTURES	**52**	EXERCISES	-	LABORA-TORY	-	HOME-WORK	**98**	**TOTAL HOURS: 150**

Student performance/ evaluation:	The evaluation will be carried out through: • A Final (written) examination without the use of notes and books. Note: During the semester, students have the opportunity to be examined in two different parts (progress examinations) replacing the final exams.