1st Semester

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
MATHEMATICS I	**TF 1000**	**1**
Course Type :	Hours/Weeks/WS	Number of credits
Lecture	**Four (4)**	**7**

Lecturer: Pliakis D

Institute/Department: TEI-Technological Educational Institute of Crete, Department of Environmental and Natural Resources Engineering.

Course Description: **This is the first course of Mathematics and it gives the essential tools of differential and integral Calculus of functions of one variable and the basic concepts of Linear Algebra with emphasis to the applications on the domain of Applied Sciences.**

Course Outline:

- Complex Numbers, algebra of complex numbers, trigonometric form of complex numbers,Euler formula,Geometric interpratation of complex numbers, power and root of complex numbers.
- Matrices,determinants,inverse matrices, rank of a matrix, linear systems and matrices,diagonalisation of matrices ,canonical form of a matrix.
- Real function of one variable,limits,continuity,derivative,geometric interpratation of the derivative,differential,Mean value theorem,Cauchy th,Taylor Series.Graphs of function of one variable,Indefinite integral,sequences and series,definite integral and applications.Improper integrals.

Bibliography:

1.Differential and Integral Calculus I,G.B Thomas,R.L Finney(Adisson Welsey/PEK)

2.Differential and Integral Calculus I,Th Apostol(Ed Atlantis)

3.Advanced Mathematics Spiegel,Ed. (Schaum/ESPI)

Teaching method: Lectures, supported by Computer demonstrations

Assessment: Coursework (30%) and final examination (70%).

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Physics	**TF 1001/TF 1101**	**1st**
Course Type :	Hours/Weeks/WS	Number of credits
Lecture – Laboratory	**4+2**	**8**

Lecturer: Dr Filippos Vallianatos, Professor.

Institute/Department: TEI of Crete, Department of Environmental and Natural Resources Engineering, Branch of Chania.

Course Description:

The primary aim of Physics is to describe natural phenomena in terms of fundamental principles. This core unit course is intended to introduce students to the basic science prerequired to the majority of other cources and specialization. At the end of the physics course students should be familiar with the scientific way of thinking and should be able to analyze, interpret and present experimental data.

Course Outline:

- Measurements, units, vectors
- Static & Dynamics.
- Kinematics, Newton's laws of motion.
- Mechanical oscillations, Theory of elasticity, elastic waves.
- Mechanical properties of solids, Hooke 's Law.
- Introduction to Thermodynamics. Black body radiation. The Laws of Kirckoff, Wien, Rayleigh-Jeans, Plank.
- Electromagnetic waves.

Laboratory Outline:

- *Theory:*

Measurements and errors, graphs.

- *Experiments:*

Kinematics on an airtrack.

Measurement of spring's constant.

Oscillation of a pendulum.

Measurement of the speed of sound in air.

Measurement of the linear expansivity of metals.

Measurement of the focal length of a lens.

The Stefan-Boltzman's law.

Photoelectric effect.

Spectroscopy of visible light.

Radiation measurements.

Bibliography:

1. Halliday - Resnick, *Physics*, (Part I, II), 1976.
2. H. D. Young, *University Physics*, Extended version with Modern Physics (vol. I, II), 1994.
3. R. Serway, *Physics for Scientists and Engineers*, 1990.
4. D. Schaum, B. S. Carel, W. van der Merwe, *General Physics*.
5. M. Alonso, E. Finn, *Fundamental University Physics*, (vol. I, II), 1981.
6. K. Ford, *Classical and Modern Physics*, (vol. I, II), 1980.

Teaching method: Lectures (2 per week), experimental exercises (1 per week).

Assessment: Theory: midterm test (optional, 40%), final examination.

Laboratory: homework (30%), final examination.

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Chemistry I	**TF 1002/TF 1102**	**1st**
Course Type :	Hours/Weeks/WS	Number of credits
Lectures and Laboratory experiments	**3 hours lecture, 2 hours laboratory per week**	**7**

Lecturer: Dr. N. Lydakis – Simantiris, Ass. Professor

Institute/Department: TEI-Technological Educational Institute of Crete, Department of Environmental and Natural Resources Engineering.

Course Description:

Chemistry I introduces students to basic chemical aspects such as, measurement, units, atoms and molecules, atomic structure and atomic properties, chemical bond, solution chemistry etc. The course prepares students for the chemistry laboratories of the first two semesters and, also, for other courses such as atmospheric pollution, waste water management, soil science, where the above mentioned knowledge is needed as a prerequisite.

Laboratory experiments include: introduction to a chemistry laboratory, simple chemical techniques, learning how to present results.

Course Outline:

- **Introduction – statistics**

- **Nomenclature – Electronic conformation of atoms**
- Chemical forms – nomenclature
- Atomic structure, atomic models, quantum numbers
- Periodic Table
- Periodic properties of the elements
- Atomic orbitals

- **Chemical Bond**
- Ionic bonding
- Covalent bonding
- Covalent bonding and molecular structure
- Ionic character of covalent bond
- Molecular geometry
- Van der Waals bonding
- H-bonding

- **Solution Chemistry**
- Solutions
- Colligative properties
- Chemical equilibrium
- Acids, bases, salts
- Ionic equilibrium
- Hydrolysis – buffers
- Colloids

- **Redox Chemistry**
- Oxidation – reduction
- Oxidation numbers

- **Energetics**
- Introduction to thermodynamics
- Chemical kinetics

Laboratory outline

- Laboratory Safety
- Analytical balance - Experimental errors
- Solutions
- Crystallization – recrystallization
- Colligative properties – molecular mass determination
- Acid base titrations I – protolytic indicators
- Acid base titrations II – titration of a weak acid by a strong base
- Soxhlet extraction
- Cl^- determination (Mohr method)
- Chemical Equilibrium

Bibliography:

1. Ebbing, Gammon, *General Chemistry*, 6th ed. Houghton Miffin Co. 1999
2. N. Klouras, *Principles of inorganic chemistry*, P. Traulos eds. 2000.
3. Lalia-Kantouri, Papastefanou, *General and Inorganic Chemistry*, Zitis Press., 1995.

10. T. P. Hadjiioannou, Chemical Equilibrium and Inorganic Qualitative Semi microanalysis, Mavromatis eds. 1993.

Teaching method: Lectures, supported by transparencies. Laboratory experiments.

Assessment: Theory: midterm test (optional, 40%), final examination.

Laboratory: homework (40%), final examination.

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Informatics I	**TF 1103**	**1st**
Course Type :	Hours/Weeks/WS	Number of credits
Laboratory	**3 / 10**	**2**

Lecturers: Dr Dimitriou Vasilis, Lecturer

Institute/Department: TEI-Technological Educational Institute of Crete, Department of Environmental & Natural Resources Engineering.

Course Description:

Introduction. Information and Informatics. Computer Performance. History of Computers and Communication Technologies. Information Digitization and Representation. The concepts of Software and Hardware. Computer Parts (Central Processing Unit, different types of Memory, Input and Output devices etc) and Peripheral devices.

Introduction to Operation Systems (Windows, Linux, Mac OS, DOS). Introduction and use of Microsoft Windows. Text processing and preparation using Microsoft Word, Docs, Matrices, Equations. Performing calculations on data, sorting data and working with charts using Microsoft Excel Spreadsheet Program, Functions and data analysis. Microsoft Access Database creation and Management Program. Exercises following the theory

Course Outline:

- Introduction
- Microsoft Windows, Linux Distributions & Associated Programs
- Microsoft Word
- Microsoft Excel
- Microsoft Access.

Bibliography:

- Willard Kinkoph, Greek Ms Office 2007, (in Greek).
- Wempen Faithe, Greek Access 2007, (in Greek)

Teaching method: Lectures (1 per week).

Assessment: Final examination (100%).

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Computer Aided Design - CAD	**TF 1104**	**1st**
Course Type :	Hours/Weeks/WS	Number of credits
Laboratory	**4**	**2**

Lecturer: Emmanuel Maravelakis, As. Professor.

Institute/Department: TEI-Technological Educational Institute of Crete, Department of Environmental and Natural Resources Engineering.

Course Description:

Theory and applications of cutting edge technologies in CAD systems, Product lifecycle, Industrial Design, Reverse Engineering, Computer Aided Manufacturing, Virtual Manufacturing, 3D modeling, Parametric Design, Solid modeling, Sheet metals, Assembly.

Course/Laboratory Outline:

- Basic Elements of technical drawing – AUTOCAD 2014.

Bibliography:

1. **CAD/CAM Systems & 3D Modeling, N. Bilalis & E. Maravelakis, Kritiki Publishing**
2. **Mechanical Design" , A. Antoniadis, Tziolas Press. (In Greek)**

Teaching method: Lectures (1 per week), laboratory (1 per week).

Assessment: Laboratory: (50%), final examination (50%).

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Energy, Environment & Natural Resources	**TF 1005**	**1st**
Course Type :	Hours/Weeks/WS	Number of credits
Lecture	**2**	**4**

Lecturer: Ioannis Vourdoubas, Lecturer

Institute/Department: TEI-Technological Educational Institute of Crete, Department of Environmental and Natural Resources Engineering.

Course Description:

Introduction to the energy and natural resources terminology. Introduction to Natural resources . Energy sources and energy demand. Shankey diagram. Energy around the world. Energy resources in various areas. Energy and its effect in the environment. Ozone depletion and greenhouse gas emissions. Categorization and management of natural resources and the environment. Sustainable development and sustainability indeces.

Course Outline:

- Introduction
- Energy and natural resources
- Energy needs around the world
- Energy and the environment
- Management of natural resources
- Ozone depletion , Acid rain
- Greenhouse gas emissions
- Environmental policy
- Sustainable development
- Sustainability indices

Bibliography:

- Natural Resources and Energy Management, D. Kordosis, (in Greek)
- Electric Energy and Environment, Schawaller, Gilberti.

Teaching method: Lectures (2 hours per week)

Assessment: Theory: midterm test (optional, 40%), final examination (100%).