# 2nd Semester

COURSE UNIT DESCRIPTION

| Course Title : | Course-No. : | Semester : |
|---|---|---|
| **MATHEMATICS II** | **TF 2000/TF 2100** | **B** |
| Course Type : | Hours/Weeks/SS | Number of credits |
| **Lecture-Lab** | **4 Lec-2 Lab** | **8** |

**Lecturer:** Taxiarchis Papakostas,PhD

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

**Course Description:**

Introduction to Differential Equations(Ordinary Differential Equations,ODE's) and applications of ODE's.Functions of two and more variables,double and triple integrals,applications in the domain of Applied Sciences.

**Course Outline:**

- Introduction:

Introduction to Differential equations ,modelling of applied problems by ODE's,solutions of ODE's,methods of integration of ODE.

First order ODE's:

Separable,homogeneous,linear,Bernoulli,total,Cauchy problem,existence and uniquness,numerical methods,applications.

Second order ODE's:

Cauchy problem,general integral,Wronskians,linear with constants coefficients,homogeneous and non-homogeneous,Euler's ODE's,applications.

Function of many variables:

Limits ,continuity,partial derivatives,differential,Jacobians.Taylor series of functions of two variables and extrema,constrained extrema of functions of many variables,Lagrange multipliers,apllications.

Special Functions:

Frobenious method for ODE's of second order,Bessel functions,Gamma and Beta functions,other special functions and related ODE's.

Multiple Integration:

Double and triple integrales and applications

**Bibliography:**

**1.**Advanced Calculus,Spiegel(Schaum/ESPI)

**2.**Differential and Integral Calculus,G.B Thomas,R.L Finney II (Adisson-Wesley/PEK)

**3.**Differential and Integral Calculus II,T Apostol(Atlantis)

**Laboratory:**

Use of the programming system of symbolic calculus MACSYMA,to solve problems of applied

problems of Mathamatica I and II in 12 seances of two hours each.

**Assessment:**

Final examination (50%) and five tests in Macsyma(50%).

COURSE UNIT DESCRIPTION

| Course Title : | Course-No. : | Semester : |
|---|---|---|
| **Chemistry II** | **TF 2001/TF 2101** | **2nd** |
| Course Type : | Hours/Weeks/SS | Number of credits |
| **Lectures and Laboratory experiments** | **3 hours lecture, 2 hours laboratory per week** | **7** |

**Lecturer:** Dr. N. Lydakis – Simantiris, Lecturer.

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

**Course Description:**

Chemistry II course includes the following topics: study of oxidation-reduction reactions, principles of thermodynamics, spectroscopy, chromatography, basic organic chemistry, introduction to biochemistry. The course, along with Chemistry I, provides fundamental background to students towards their preparation as technicians in a modern laboratory. The topics covered by Chemistry II are linked with the laboratory experiments which include: potensiometry, titrations, redox chemistry, simple organic chemistry experiments, spectroscopy, qualitative analysis.

**Course Outline:**

**Instrumental Methods in Chemical Analysis**

- Introduction to instrumental chemical analysis
- UV – VIS spectroscopy
- Fluorimetry
- Atomic spectroscopy
- Introduction to chromatography
- Thin Layer chromatography
- High Pressure Liquid chromatography
- Gas chromatography

**Fundamentals of Organic Chemistry**

- Chemistry of Carbon
- Nomenclature of organic compounds
- Structure and Properties
- Isomerism, Stereochemistry, stereoisomers

**Laboratory outline**

- pH – Conductivity
- Water Hardness
- Thermochemistry
- Redox Reactions
- Buffers
- Acid – base titrations
- Extraction

- UV-Vis Spectroscopy
- Unknown solution analysis
- Thin Layer Chromatography

**Bibliography:**


1. Ebbing, Gammon, *General Chemistry*, 6th ed. Houghton Miffin Co. 1999.
2. N. Klouras, *Principles of inorganic chemistry*, P. Traulos eds. 2000.
3. A. Varvoglis, Principles of organic chemistry, Zitis Press, 1996.
4. T. P. Hadjiioannou, Chemical Equilibrium and Inorganic Qualitative Semi microanalysis, Mavromatis eds. 1993.
5. Alexandrou – Varvoglis, Lectures on Organic Chemistry, Zitis eds, 1981.


**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 II** | **TF 2102** | **2nd** |
| Course Type : | Hours/Weeks/SS | Number of credits |
| **Laboratory** | **3 / 10** | **2** |

**Lecturers:** Dr Dimitriou Vasilis, Lecturer

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

**Course Description:**

The main scope of this course is to introduce students in the concepts related to Structured Programming. For this reason Visual Basic Programming language is used. Visual Basic is an object oriented programming language, meaning that most things in a program are designed as objects and also an event driven one, which means that of sequential code is associated with certain events such as the clicking of a button.

The content of this course has been chosen to serve also other courses of the Department. In particular, some of the main scopes of the course are to make students capable of building applications so as to solve mathematical, mechanical and problems of physics that they will have to deal with in the correspondent courses of the department and later at their jobs. By the end of the course students are able to build their own Visual Basic applications, Debug Visual Basic programs and also examine existing code and determine its function.

**Course Outline:**

- Structured Programming
- Command Button Forms.
- Variables
- Windows Controls (eg Forms, Labels, Option boxes etc) and Properties
- Numerical Operators
- Binary and Logical Operators
- If …. then …. Else structures
- Do … While structures
- For / next structures
- Matrices
- Subroutines and Functions
- Creation and reading of files

**Bibliography:**


- Learn Visual Basic into 24 Hours, Berry (in Greek)
- Full Microsoft Visual Basic Manual 2008, Petrutsos (in Greek)


**Teaching method:** Lectures (1 per week).

**Assessment:** Final examination (100%).

COURSE UNIT DESCRIPTION

| Course Title : | Course-No. : | Semester : |
|---|---|---|
| **Engineering Thermodynamics** | **TF 2003/TF 2103** | **2nd** |
| Course Type : | Hours/Weeks/SS | Number of credits |
| **Lecture – Laboratory** | **2+2** | **5** |

**Lecturer:** Dr Vassilis Saltas, Assistant Professor

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

**Course Description:**

The course provides the basic principles of classic thermodynamics, with an engineering perspective, along with the relationship between the theory of thermodynamics and the behavior of real thermal systems and cycles.

**Course Outline:**

- Thermodynamic systems
- Thermodynamic properties of a substance
- Thermal processes and cycles
- Zero law of Thermodynamics
- Equations of State
- Work, Heat and Energy
- First and Second Law
- Reversible and irreversible processes
- Entropy
- The properties of vapor
- Thermodynamic cycles, power and refrigeration systems
- Irreversibility and availability
- Gas mixtures
- Thermodynamic relations

**Laboratory Outline:**

- Electrothermal pump
- Ideal-gas relations
- Specific Heat of metals
- Boiling temperature rise
- Enthalpy and internal energy of Combustion
- Joule - Thomson coefficients of $CO_2$ and $N_2$
- Mollier diagram – properties of vapor

**Bibliography:**

- Thermodynamics for Engineer, by Y.A. Gengel, M.A. Boles
- Applied Thermodynamics, Kappos
- Applied Thermodynamics, N. Komoutsos
- Technical Thermodynamics, K. Lefas
- Interactive Thermodynamics Software Ver. 1.5+
- Fundamentals of Thermodynamics +2 disks, Howel

**Teaching method:** Lectures (1 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 : |
|---|---|---|
| **Electrical Circuits** | **TF 2004 & TF 2104** | **2nd** |
| Course Type : | Hours/Weeks/SS | Number of credits |
| **Lecture + Laboratory** | **2+2** | **5** |

**Lecturer:** Emmanuel Maravelakis, As. Professor.

**Institute/Department:** TEI of Crete, Department of Environmental and Natural Resources Engineering

**Course Description:**

This course aims at providing the basic knowledge in Electrical Circuits, in order the students to be able to identify and analyze the basic parts in a circuit, to know the basic electricity laws in DC and AC and to be able to interpret important electrical parameters for Renewable Sources Systems.

**Course/Laboratory Outline:**

- Electrical Variables
- Basic electrical laws and elements
- Electrical Power & Energy
- Kirchhoff laws
- Basic Circuit Analysis
- DC, AC
- RLC circuits
- Power factor

**Bibliography:**

- Electric Circuits, Bogart, Macmillan, McGraw-Hill
- Introductory Circuit Analysis, Boylestad, Prentice Hall

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

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

COURSE UNIT DESCRIPTION

| Course Title : | Course-No. : | Semester : |
|---|---|---|
| ECOLOGY | **TF 2005** | **2nd** |
| Course Type : | Hours/Weeks/SS | Number of credits |
| **Lecture –**<br><br>**Practical** | **2** | **3** |

**Lecturer:** Professor George Stavroulakis

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

**Course Description:**

The aim of the course is to inform the student for the mutual dependence between the biotic and abiotic environment and at the same time trouble on the consequences that planet Earth will suffer if man proceeds to thoughtless exploitation of Natural Resources.

**Course Outline:**

Introduction to Ecology: Ecosystems – Applications of Ecology

Organisms in their environment: Liebig's Law – Shelford's Law – Distribution of organisms – Adaptation of organisms

Population ecology: Population characteristics – Mortality and Fertility – Population Interactions – Competition – Predation – Adaptation – Symbiosis

**Ecological succession**

**Community stability**

Ecosystem Productivity: Energy Flow – Ecosystem characteristics – Food Chains

Nutrient cycling: Water cycle – Nitrogen cycle – Phosphorus cycle – Carbon cycle – Sulfur cycle.

Man as ecological factor: Acid rain – Glasshouse effect – Ozone hole

Natural ecosystems: Deserts – Tundra – Prairies – Forests – Rivers – Lakes – Seas.

**Bibliography:**

Introduction to Ecology. J.C. Eberlin

Ecology. S Likakis

Environment I , II. J. Miller

**Teaching method:** Lectures are supported by transparencies and computer demonstrations.

**Assessment:** Coursework (40%) and final examination (60%).

    - Academic Staff
- Administration
- Department of Environmental and Natural Resources Engineering
    - Sections
    - Administration
    - Academic Staff of the Department
    - Description of Courses
    - External Evaluation Report
- Students
    - Erasmus
- Department of Music Technology and Acoustics (Rethimno)