3rd Semester

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Environmental Statistics	**TF 3001/TF 3101**	**3**nd
Course Type :	Hours/Weeks/WS	Number of credits
Lecture-Laboratory	**3+2**	**5**

Lecturer: Dr. Sofia Lomvardou, Adjunct Professor.

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

Course Description:

The aim of the course is to introduce the fundamentals of probability theory and statistical analysis to the students. The two branches of statistical analysis (descriptive and inferential statistics) are examined. At the end of the course students should be familiar with a collection of methods that describe some aspect or characteristic of a phenomenon under study and to use the description of that characteristic.

Course Outline:

- Introduction
- Probability: Fundamental concepts and operational rules, conditional probability and statistical independence, Baye's formula, counting techniques
- Discrete random variables: general properties of probability distributions, the Binomial distribution, the Poisson distribution
- Continuous random variables: density function, the Normal distribution
- Statistical inference: sampling distributions, central limit theorem, point and interval estimators
- Hypothesis testing
- Some additional methods of data analysis: non-parametric tests

Laboratory outline:

- Introduction
- Categorical data
- Numerical data

- Descriptive statistics
- Correlation
- Simple linear regression
- Simple nonlinear regression
- Multiple regression
- Time series

Bibliography:

1. Statistics, Koliva Maxaira (in Creek)
2. Statistical Analysis for Engineers and Scientists, J. Wesley Barnes
3. Engineering Statistics, Montgomery, Douglas
4. Data Analysis using Excel, M. Middleton

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

Assessment: Theory: Final examination (100%) or midterm test (40%) and final examination (60%)

Laboratory: homework (50%), final examination

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Analog and Digital Circuits	**TF 3002/TF 3102**	**3**[th]
Course Type :	Hours/Weeks/WS	Number of credits
Lecture – Laboratory	**3+2 / 10**	7

Lecturer: Dr. Emmanuel Karapidakis, Ass. Professor

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

Course Description:

The aim of the course is the introduction to the fundamentals of analog and digital electronics. More precisely, at the end of this course the student must be familiar with basic electronic circuits, Boolean algebra and binary logic.

Course Outline:

- Introduction
- Diodes circuits
- Special diode circuits (LED, Zener,…)
- AC/DC converter
- Transistors
- Boolean algebra
- Binary logic

Laboratory Outline:

- Introduction
- Diodes circuits
- Special diode circuits (LED, Zener,…)
- AC/DC converter
- Transistors
- Boolean algebra
- Binary logic

Bibliography:

1. Semicontactors circuit approximations, A.P.Malvino
2. Digital design, Moris Mano

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

Assessment: Theory: Final examination (100%)

Laboratory: homework (50%), final examination

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Geology	**TF 3003/TF 3103**	**3th**
Course Type :	Hours/Weeks/WS	Number of credits
Lecture – Laboratory	**3+2 / 10**	**4**

Lecturer: Dr. Kokkinou Eleni, Ass. Professor

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

Course Description:

Introduction to geology. Origin and formation of Planet Earth and the atmosphere. Plate tectonics, dynamics of the lithosphere, earthquakes. Magmatism, volcanism, metamorphism. Minerals and rocks, ores. Deformation of rocks. Evolution of geological concepts. Sedimentology including erosion, deposition, transportation and the build-up of sedimentary rocks. Evolution of life, both animals and plants. Geomorphologic processes and landscape formation. Structural Geology: stress and strain, mechanical properties of materials; folds, faults and fractures; geological structures in two and three dimensions; projection on geological maps, construction of geological sections and stereograms; interpretation of geological maps, geological structures in tectonic contexts. Earthquakes and Earth interior.

Course Outline:

- Introduction to geology.
- Geological Cycles, Plate tectonics
- Minerals and rocks
- Volcanos
- Plutonic rocks
- Sedimentary rocks
- Metamorphic rocks
- Geologic Time, Stratigraphy
- Geological sections
- Structural Geology
- Earthquakes

Laboratory Outline:

- Exercises in construction of geological sections

Bibliography:

1. Reading the Rocks: The Autobiography of the Earth by Marcia Bjornerud, Published October 31st 2006 by Basic Books.

2. Earth: An Introduction to Physical Geology by Edward J. Tarbuck, Dennis Tasa, Published March 14th 2004 by Prentice Hall.

3. Why Geology Matters: Decoding the Past, Anticipating the Future by Doug Macdougall, University of California Press, 2011.

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 :
Geographic Information Systems GIS	**TF 3004 / TF 3104**	**3rd**
Course Type :	Hours/Weeks/WS	Number of credits
Lecture – Laboratory	**2+3**	**5**

Lecturer: Ilias Papadopoulos, Lecturer

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

Course Description: The aim of the course is to introduce students to digital images and digital mapping: Defining a Geographic Information System (GIS). Components of a Geographic Information System. Data sources. Raster and Vector Datasets. Database Fundamentals (Relational Basics, Queries, Joins). Coordinate Systems, Datums and Projections. Georeferencing data. Fundamentals of a Global Positioning System (GPS). Incorporating GPS output in GIS. Spatial query and analysis. Thematic maps. Digital Elevation Models and their application to hydrology. Case studies in GIS.

Course Outline:

- Introduction to a Geographic Information System.
- Components of a GIS. Data sources.
- Raster and Vector Datasets.
- Database Fundamentals.
- Coordinate Systems, Datums and Projections. Georeferencing data.
- Fundamentals of a Global Positioning System (GPS). Incorporating GPS output in GIS.
- Spatial query and analysis.
- Map elements and thematic maps.
- Digital Elevation Models and their application to hydrology.
- Case studies in GIS.

Laboratory Outline:

- Review of essential computing skills. Introduction to GIS and to ArcGIS Desktop 9.0.
- Georeferencing a map
- Data digitization (ArcCatalog, Shapefiles creation, snapping, sketch tool)
- Data digitization (editing, attribute tables)
- Calculating Fields in attribute tables – Calculating Statistics

- Thematic maps-Symbology-Layouts
- Manipulating Tabular Data
- Spatial Analysis
- Queries-Buffers
- Introduction to ArcToolbox Analysis Tools

Bibliography:

Course

1. Geographic Information Systems and Spatial Analysis, 2002, Koutsopoulos, K., Papasotiriou Editions, Athens (ISBN 960-7530-20-9, PP 400)
2. Introduction to Remote Sensing and Geographic Information Systems, 2000, Vol. 2 Syllaios, N.G., Giahoudi-Gianouli Editions, Thessaloniki, ISBN: 960-7425-309-8)
3. Introduction to Geographic Information Systems, 2007 Zisou., A., Stamoulis Editions, Athens.
4. UNESCO TRAINING MODULES 1999: GIS
   http://iodeweb5.vliz.be/oceanteacher/resources/other/GISModules/index.html

Laboratory

1. GIS Laboratory notes, 2007, Kouli, M., Alexakis, D., Chania
2. Geographic Information Systems Applications using the Arcgis software, 2003 Koutsopoulos, K., Papasotiriou Editions, Athens
3. ArcGIS 9x Applications with simple words, 2005, Androulakakis, N., Koutsopoulos, K., Papasotiriou Editions, Athens
4. Special Applications in ARCGIS, 2006, Miliaresis, G., ION Editions., Athens

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

Assessment: Theory: Independent research work (optional projects) (20%) and final examination (80%).

Laboratory: Students presence in class (20%), final examination.

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Manufacturing Technology	**TF 3005 / TF 3105**	**3rd**
Course Type :	Hours/Weeks/WS	Number of credits
Lecture – Laboratory	**2+2**	**5**

Lecturer: Dr. Vasilis Dimitriou, Lecturer

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

Course Description:

Introduction. Fundamentals and applications of manufacturing processes. Materials properties and manufacturing. Theory and applications of metalworking, casting, metal cutting, metal forming, welding. Non-conventional and new manufacturing processes. Introduction to manufacturing and production automation, by the help of CNC machines, modelling and design by CAD/CAM/CAE/FEM and RP systems. Applications to Renewable Energy Systems. Environmental Issues in Manufacturing.

Course Outline:

- Introduction
- Fundamentals of Manufacturing Processes
- Machine Tools
- Casting
- Metal cutting
- Theory and applications of metal cutting, Cutting Processes (turning, milling, drilling, etc)
- Metal forming processes (rolling, forging, deep drawing, sheet metal forming, etc)
- Non conventional manufacturing methods (plasma, laser, waterjet, etc)
- Manufacturing and production automation systems (CNC/CAD/CAM/CAE/RP and FEM)
- CNC G-code programming & CAM automations

Laboratory Outline:

Theory:

- Measurements. Tolerances
- Tools of various types (Allen, etc).
- Introduction to thread and fasteners.
- Gears and gear trains.
- Turning, Milling, Drilling, CNC G-code programming & CAM

Experiments (performed in CNC and common machines):

- Turning 1st exercise
- Milling 1st exercise
- Turning 2nd exercise
- Milling 2nd exercise
- Turning 3rd exercise
- Milling 3rd exercise

Bibliography:

- Manufacturing Engineering and Technology, S. Kalpakjian, S. R. Schmid, S. Sch,dt
- Manufacturing Process and Equipment, J. Tlysty, G. Tlusty
- Fundamentals of modern manufacturing
- Manufacturing Automation: Metal Cutting Mechanics, Machine Tool Vibrations, CNC design, Y. Altintas

- Virtual Manufacturing, Prashant Banerjee and Dan Zetu

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

Assessment: Theory: Final examination (100%)

Laboratory: Lab/homework (50%), final examination (50%).

COURSE UNIT DESCRIPTION

Course Title :	Course-No. :	Semester :
Sociological Approach for Environment and Natural Resources	**TF 3006**	**3th**
Course Type :	Hours/Weeks/SS	Number of credits
Lecture	**2**	**4**

Lecturer: Dr. Kotti Melina, Lecturer

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

Course Description:

The target of this course is the study of interactions between humans and nature. The students will learn about the environmental organizations, the green political groups, the international conferences for sustainable development and the environmental education.

Course Outline:

- Ancient years and nature.
- Religions and nature.
- The most dangerous environmental accidents of the planet.
- Deep ecology.
- Green political groups.

- Ecofeminism.
- Environmental Education.
- Environmental organizations.

Bibliography:

- Caduto, M.J., A Guide on Environmental Values Education, UNESCO, Environmental Education Series, 13, 1985.
- McLaughlin, A., Regarding Nature: Industrialism and Deep Ecology, State University of New York Press, NY, 1993.
- WEDO/REDEH, Women's Action Agenda for a Healthy and Peaceful Planet 2015, Women's Environment and Development Organization (WEDO), NY, 2002.

Teaching method: Lectures (1 per week).

Assessment: Theory: final examination (100%).