



# UNIVERSITY OF NICOSIA ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ

University of Nicosia, Cyprus

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| <b>Course Code</b><br>OGAS-215             | <b>Course Title</b><br>Fuel Science and Technology | <b>ECTS Credits</b><br>6                  |
| <b>Department</b><br>Management and MIS    | <b>Semester</b><br>Fall / Spring                   | <b>Prerequisites</b><br>None              |
| <b>Type of Course</b><br>Major Requirement | <b>Field</b><br>Chemistry                          | <b>Language of Instruction</b><br>English |
| <b>Level of Course</b><br>Undergraduate    | <b>Year of Study</b><br>2 <sup>nd</sup>            | <b>Lecturer</b><br>Dr. Agapios Agapiou    |
| <b>Mode of Delivery</b><br>Face-to-face    | <b>Work Placement</b><br>N/A                       | <b>Co-requisites</b><br>None              |

### Objectives of the Course:

The main objectives of the course are to:

- give students an introduction to the basic principles of chemistry
- provide an introduction to fossil fuel extraction and refinement
- help to develop an appreciation for the effects of fossil fuel use on the environment
- demonstrate physical and chemical properties and changes of matter in a laboratory setting

### Learning Outcomes:

After completion of the course students are expected to be able to:

1. Discuss the concept of temperature scales, physical and chemical properties, changes in matter, density, and common methods of separation of mixtures
2. Explain atomic and molecular structure and discuss the arrangement of atoms or molecules in different forms of matter
3. Utilize chemical equations in demonstrating the chemical changes that take place in matter
4. Calculate amounts of product formed in chemical reactions, with particular emphasis on fossil fuel combustion in air, and discuss the effects of fossil fuel combustion on the atmosphere
5. Discuss how the combustion products of fossil fuels contribute to the greenhouse effect
6. Calculate the amount of heat that accompanies fossil fuel combustion
7. Discuss the basic properties of ideal and real gases, and in particular the volume occupied by a gas, and the pressure it exerts on a container
8. Identify the hydrocarbon components of petroleum products and natural gas
9. Discuss qualitatively the chemical reactions that take place in the different layers of the Earth's atmosphere, ozone production and depletion, and the protection of living organisms from solar uv radiation by the atmospheric components

**Course Contents:**

1. Matter and Measurement
2. Atoms and Molecules
3. Chemical Reactions and Chemical Equations
4. Basic Calculations in Chemistry
5. Thermochemistry
6. Theory of Gases
7. Intermolecular Forces and Phase Changes
8. Petroleum and Natural Gas
9. Atmospheric Chemistry

## Laboratory Experiments

1. Laboratory Safety Demonstrations
2. Constant Pressure Calorimetry
3. Estimation of the Molar Mass of Carbon Dioxide Gas
4. Measurement of Density
5. Fractional Distillation
6. Determination of the Boiling Point of a Liquid

**Learning Activities and Teaching Methods:**

Lectures 3 hrs/wk, Laboratory Practical Sessions 2 hrs/wk, Assignments and Final Exam

**Required Textbooks:**

| Authors   | Title                         | Publisher                | Year                                | ISBN                    |
|---|-------------------------------|--------------------------|-------------------------------------|-------------------------|
| 1. T.L. Brown,<br>H.E. Lemay,<br>B.E. Bursten,<br>C.J. Murphy | Chemistry The Central Science | Prentice<br>Hall         | 2009<br>11 <sup>th</sup><br>Edition | ISBN: 0-13-<br>235848-4 |
| 2. P.G.<br>Hajigeorgiou                                       | CHEM-215 Laboratory Manual    | University<br>of Nicosia | 2012                                |                         |
| 3. P.G.<br>Hajigeorgiou                                       | CHEM-215 Lecture Notes        | University<br>of Nicosia | 2012                                |                         |

**Recommended Textbooks/Reading:**

| Authors   | Title   | Publisher         | Year                               | ISBN                    |
|---|---|-------------------|------------------------------------|-------------------------|
| 1. R.H.<br>Petrucci, W.S.<br>Harwood, and<br>F.G. Herring | General Chemistry Principles and<br>Modern Applications | Prentice Hall     | 2002 8 <sup>th</sup><br>Edition    | ISBN: 0-13-<br>014329-4 |
| 2. J. Olmsted<br>III, and G.M.<br>Williams                | Chemistry The Molecular Science                         | WCB<br>Publishers | 1997<br>2 <sup>nd</sup><br>Edition | ISBN: 0-<br>8151-8450-6 |