Centre	**University College of Engineering of Vitoria-Gasteiz**
Name of subject	**27818 – Chemical Engineering Experimentation I**
Qualification	**Degree in Industrial Chemical Engineering**
Type	**Compulsory**
Credits	**6 ECTS**
Year	**3**
Term(s)	**1st**
Department	**Chemical and Environmental Engineering**
Language	**Spanish**

Outcomes / Objectives

PRACTICAL WORK IN THE FIELD OF CHEMISTRY AND CHEMICAL ENGINEERING: FLUID FLOW SYSTEMS, HEAT TRANSFER, MASS TRANSFER OPERATIONS.

1. Be able to design and manage applied experimentation procedures and operate heat transfer related equipment and systems, using heat exchangers. TEQI3

2. Be able to design and manage applied experimentation procedures and operate mass transfer related equipment and systems, applying the concepts of liquid-vapour, liquid-liquid and solid-liquid phase equilibrium. TEQI3

3. Be able to design and manage applied experimentation procedures and operate mass transfer related equipment and systems, applying the techniques of distillation, rectification, extraction and absorption. TEQI3

4. Be able to design and manage applied experimentation procedures and operate mass transfer related equipment and systems, using continuous operation and single-stage and multistage systems. TEQI3

5. Apply the strategies of scientific methodology, analyse the problem situation qualitatively and quantitatively; propose hypotheses and solutions to solve chemical engineering problems. TEQI8.

6. Use specific vocabulary and terminology to effectively communicate knowledge, procedures and results in the field of chemical engineering. TEQI9.

7. Work efficiently in multidisciplinary environments integrating capabilities and knowledge to make decisions in the field of chemical engineering. TEQI10

8. Have knowledge of, understand and apply legislation, specifications, and enforceable rules and regulations. TEQI11

9. Carry out measurements, calculations, studies and reports, during and upon completion of each practical task performed in the subject. TEQI12

OBJECTIVES
Apply heat transfer knowledge.
Apply mass transfer knowledge.
Operate equipment and systems applying the techniques of distillation, rectification, extraction and absorption.
Write reports of the measurements and calculations made during the practical tasks.

Syllabus

Practical task 1. Fluid flow.

Load losses in pipes. Osborne-Reynolds experiment. Viscosity and surface tension

Practical task 2. Fluidised systems.

Study of load losses in fluidised beds

Practical task 3. Thermal properties.

Specific and latent heat calculation. Variation of the boiling point

Practical task 4. Granular solids.

Calculation of particle size distribution in aggregates.

Practical task 5. Properties of solutions.

Partition coefficient calculation. Variation of the equilibrium constant.

Practical task 6. Mass transfer.

Drying of solids by hot air convection tunnel. Study of the operation.

Practical task 7. Reaction kinetics

Flow reactors: Complete mix and piston flow. Kinetics of gas dissolution. Reaction order and constant

Methodology

Teaching Method

Face-to-Face Teaching Hours								
Lectures	**Seminars**	**Classroom practice**	**Lab. practice**	**Computer sessions**	**Clinical practice**	**Workshops**	**Industrial workshops**	**Field practice**
			60					
Student Hours of Non Face-To-Face Activities								
Lectures	**Seminars**	**Classroom practice**	**Lab. practice**	**Computer sessions**	**Clinical practice**	**Workshops**	**Industrial workshops**	**Field practice**
			90					

Assessment System

General criteria

→Practical tasks (exercises, case studies or problems)
→Individual assignments
→Presentation of assignments, reading...

Clarification regarding assessment

→Students must attend all practical sessions to pass the subject
→In-situ oral tests to assess comprehension: 20 %
→Laboratory reports: 65 %
→Laboratory skills: 15 %

Bibliography

Basic Bibliography

- HORTA, A. y otros, Técnicas experimentales de química. Ed. UNED
- MARTINEZ J. y otros, Experimentación en Química General. Ed.Thomson
- MCCABE, SMITH, HARRIOT. Operaciones Uniarias en Ingeniería Química. 4ta edición. Mc Graw Hill. 2010
- G. CALLEJA PARDO y col. Introducción a la Ingeniería Química. Ed. Síntesis, Madrid, 1999
- OCON J., TOJO G.: Problemas de Ingeniería Química. Operaciones Básicas. Tomo I y II. Ed. Aguilar.
- COULSON, J.H; RICHARDSON, J.F: Operaciones básicas de Ingeniería Química. Barcelona, Ed. Reverté (5 tomos).

In-depth Bibliography

- CHEMTEC, Tecnología química moderna. Ed. Reverté.
- DURST, H.D; GOKEL, G.W., Química Orgánica experimental. Ed. Reverté.
- TREYBAL, R.E: Operaciones de transferencia de masa. Mejico, Ed. McGraw-Hill
- HOUGEN D.A; WATSON K.M, RAGATZ, R.A: Principios de los procesos químicos. Barcelona, Ed. Reverté (2 tomos).

Magazines

- Ingeniería Quimica
- Tecnología del Agua

Websites

- http://www.ingenieriaquimica.net/