UNIVERSIDAD PABLO DE OLAVIDE SEVILLA

COURSE SYLLABUS

1. COURSE DESCRIPTION

Degree:	**Biotecnología**
Double Degree:	
Course:	**General Chemistry**
Module:	**BLOQUE 1 MATERIAS BÁSICAS**
Department:	**Sistemas Físicos, Químicos y Naturales**
Term:	**First Term**
Total Credits :	**6**
Year:	**1**
Type of Course:	**Basic**
Course Language:	**English**

Modelo de docencia:	**B1**
a. Enseñanzas Básicas (EB):	**60%**
b. Enseñanzas de Prácticas y Desarrollo (EPD):	**40%**
c. Actividades Dirigidas (AD):	
d.	

UNIVERSIDAD PABLO DE OLAVIDE SEVILLA

COURSE SYLLABUS

2. COURSE COORDINATOR

Name:	Dr. Patrick Merkling
Faculty:	**Facultad de Ciencias Experimentales**
Department:	Sistemas Físicos, Químicos y Naturales
Academic Area:	Química Física
Category:	Prof. Contr Dr
Office Hours:	TBD and by appointment (e-mail me to arrange a time)
Office Number:	**E22, 3.11**
E-mail:	**pjmerx@upo.es**
Telephone:	**954348643**

UNIVERSIDAD PABLO DE OLAVIDE SEVILLA

COURSE SYLLABUS

3. ACADEMIC CONTEXT

3.1. Course Description and Objectives

Note: This document is also available in spanish (Química General). I would recommend anybody go back to that document in case of doubts.
The main purpose of this course is to provide the students with fundamentals in chemistry necessary for their future work and to enable him to apply them to solve practical problems.

3.2. Contribution to the training plan

The assignment of General Chemistry belongs to the module "Chemistry in Molecular Biosciences". Within this module, the General Chemistry Course provides the students with the fundamentals and capabilities needed to understand the mechanisms underlying biological processes.

The general and specific skills achieved in this course are essential to understand further advanced matters that they will study in their degree, such as Organic Chemistry, Thermodynamics and Kinetics, Instrumental Analysis Techniques, Bioanalytical Chemistry, Biochemistry, etc.

3.3. Recommendations or prerequisites

Recommendation: having studied chemistry, physics and maths in high school

4. SKILLS

4.1 Degree skills developed during this course

Biotechnology can be defined as a technique that uses living organisms or compounds obtained from living organisms to produce products of economical, medical or social value to humans. Therefore learning about Biotechnology at the level of the Degree requires a biological and chemical knowledge base to enable students to understand the technological processes that involve living organisms.

The Report for the verification request of the graduate degree in Biotechnology from the University Pablo de Olavide referred (among others) the following competencies:
• Understand the scientific method. Know, understand and apply the tools, techniques and experimental protocols in the laboratory and acquire the skills of observation and interpretation of the results.
• Acquire basic experimental skills appropriate to each of the subjects taught, by the description, quantification, analysis and critical evaluation of the experimental results obtained independently.
• Work properly in a biological, chemical or biochemical laboratory, know and apply standards and techniques related to health and safety, handling of laboratory animals and waste management.
• Demonstrate proper integrated view of the R + D + i be able to interrelate and connect the areas of biotechnology encompassing knowledge from biological and physicochemical principles to new scientific knowledge for practical application development and introduction in the market for new biotech products of interest

4.2. Module skills developed during this course

The Degree Report includes the following module-specific skills:

1. Know the origin of the atomic/molecular properties of matter, including pure substances, mixtures and solutions.
2. Know the principles of thermodynamics and their practical application to thermochemical and thermodynamic study of a reaction and dominate the thermodynamic concept of chemical equilibrium and equilibrium constant, and be able to identify the factors on which it depends.
3. Learn the common characteristics of physicochemical transport processes: diffusion, osmosis, electrophoresis, etc ...
4. Master the concept of reaction rate and rate constant and be able to identify the factors on which it depends and know how to describe proton transfer reactions and electronical and thermodynamical concepts applied to their behavior.
5. Know the basis of spectroscopical methods for quantitative chemical analysis and structural elucidation of organic compounds.

4.3. Course-specific skills

1. Understand the atomic/molecular origin of the properties of matter, either pure substances, mixtures or solutions
2. Apply the principles of thermodynamics to thermochemical and thermodynamic study of a chemical reaction
3. Master the concept of chemical equilibrium and equilibrium constant, and be able to identify the factors on which it depends
4. Master the concept of reaction rate and rate constant and be able to identify the factors on which it depends
5. Be able to describe the proton transfer reactions and electronic and thermodynamic concepts involved in their description

5. COURSE CONTENTS (COURSE TOPICS)

Through the virtual platform a detailed syllabus will be made available that elaborates on contents, work expected from each student etc.
The topics of the course are:
• Introduction and basic concepts, Topic 0
• Atomic and molecular structure, Topic 1
• Introduction to Thermodynamics, Topic 2
• Introduction to the fundamentals of chemical kinetics and chemical equilibrium, Topic 3
• Proton transfer reactions, Topic 4
• Electron transfer reactions, Topic 5
• Spectroscopic techniques for the characterization of compounds (UV / VIS, IR, NMR) Topic 6

Description of lab sessions:
Practice 1: Spectrophotometry
Practice 2: Calorimetry
Practice 3: Acid-base and buffer solution
Practice 4: Determination of vitamin C contained in a shake or fruit juice

6. METHODOLOGY AND RESOURCES

Classes are of two general types "basic teaching" (EB) and "practices and development" (EPD). The EPD in this course are either 3-hour lab sessions or 2-hour seminars. For more details a table in the expanded teaching guide will be made available through the virtual platform.

Methodologically, transparencies will be used, seminars, individual tutorials, laboratory, and, if technology allows, use of the virtual platform.

7. ASSESSMENT

15 hours for assessment
1. Final EB + EPD exam: 3 hours, split into two same-day exams (February Examination Period)
2. Final EB + EPD exam (recovery): 3 hours, split into two same-day exams (July Examination Period)
3. Final EPD exam: 1 hour (February Examination Period)
4. Final EPD exam: 1 hour (July Examination Period)
5. EPD exams (at the beginning of the laboratory sessions): 2 hours
6. EPD exams (at the end of the problem classes): 1 hour
7. EB February Exam Review: 1 hour
8. EPD February Exam Review: 1 hour
9. EB July Exam Review: 1 hour
10. EPD July exam review: 1 hour

It is strongly recommended you use your hand-written lab book in the EPD lab exam. Your lab book may be collected by the examiner at the end of the exam. This will help the teacher in assessing the exam.

Continuous assessment consists in (1) EPD practices and seminars, (2) exams at the beginning of the seminars and (3) a compulsory work (EO) to be delivered through the virtual platform or directly at the office of the lecturing teacher. Works are due on the date indicated in the detailed Assessment Table (at the end of this section).
EB examinations, EPD and EO are weighted according to the table. In this way the student will obtain a total score as shown in Detailed Assessment Table (at the end of this section).
The final grade for the course will be drawn from the following formula:
FINAL GRADE = 0.5 x (EB) + 0.4 × (EPD) + 0.1 × (EO)

Regardless of the numerical value obtained in the above formula, the final score that appears in the records shall be subject to the following restrictions:
a) To pass the course you need to get at least 5 out of 10 and **a minimum in each of the parts** specified in the detailed Assessment Table (at the end of this section).
b) To get a B (**Notable**) in the course you must achieve at least **55% of the maximum grade in the theory exam**.
c) To get an A (**Sobresaliente**) in the course you must achieve at least **70% of the maximum score in the theory exam**.

An additional voluntary delivery will be proposed (VAS) through the virtual platform. This VAS is scored out of 10 and will not affect the final grade. However, it is a prerequisite to be eligible for honors (Matrícula de Honor).

Attendance at sessions EPD (Seminars and laboratory) is mandatory. An unjustified absence to a lab session will lead to a 20% reduction of the lab EPD grade. A single absence will be toleratated without penalty if supported by a valid medical certificate. In that case, and if the absence is for one of the seminars, the student must take the exam at a later time. An EO work is mandatory. If handed in late, 0 points out of 10 will be counted (which equals to a full point out of 10 on the total grade of the course).

Nature of compulsory work:

The mandatory EO work is about writing an article on a subject of your choice of a 3 pages maximum extent in the format of the journal MoleQla (http://www.upo.es/moleqla). The topic must necessarily be related to the course and may be further narrowed by the lecturer. Should the virtual platform forum be available, you will propose the topic or a self-explanatory title of your article in it to avoid overlapping topics. The work will be checked for possible plagiarism. If plagiarism is obvious, the work will entail a negative EO grade of -20 points. Plagiarism is considered a **very serious offense**. The maximum attainable grade in the course would be in this case a 70 (7 out of 10). The finest papers will be selected for publication in the journal. If you do not wish your article to be published, you may specify it at the end of the work itself or communicate your decision at any subsequent time in the editorial process in written form or by e-mail to the lecturer. Obviously, this will neither affect the grade of the work nor the requirements on plagiarism.

Assessment system for July exams:

The assessment system of the EB and lab EPD in July will be exactly the same as in February. The student will have to take those modules in which he failed to obtain the minimum grade required to pass the course (see detailed assessment table).

Detailed assessment table

Activity	Minimum grade[1]	Maximum grade[2]	Weighting factor	Assessment duration (hours)	Exam or due date
EB	4.0	10	50%	3(+3)	Official examination dates scheduled by Faculty Board
EPD (lab)	4.0	10	20%	1(+1)	Official examination dates scheduled by Faculty Board
EPD (seminars)	0	10	20%	2@0.5	At the beginning of every seminar

EO	0	10	10%	5	Last lecturing week of december
TOTAL	**5**	**10**	**100%**	15	
EAV	-	10	compulsory work for aiming at the highest grade (MH)		Last lecturing week of january

[1]Minimum grade for each part to pass the course
[2]Maximum achievable grade for each part

8. BIBLIOGRAPHY

The general chemistry textbooks are quite similar to each other. The main differences are the relative importance given to the different parts, the choice of examples and style of the authors.

• P. Atkins and L. Jones. "Chemical Principles - The quest for insight", 3rd ed., W.H. Freeman and Company, 2005
• R. H. Petrucci, W. S. Hardwood and F.G. Herring "General Chemistry", Eighth Edition, Prentice Hall. 2003

Complementary texts

• K. Timberlake, "Chemistry, An Introduction to General, Organic and Biological Chemistry", 10th edition, Pearson, 2011
• K.W. Whitten et al., "General Chemistry", Fifth Edition, McGraw-Hill, 1998
• J. Crowe, T. Bradshaw, "Chemistry for the Biosciences, The essential concepts", 2nd edition, Oxford University Press, 2010
• M. Paraira, "Introducción a la formulación y nomenclatura química inorgánica-orgánica" Vicens-Vives, 1995