Universitat de Lleida

DEGREE CURRICULUM

POLYMERS AND PROTEINS

Coordination: MORERA PRAT, JOSEP MARIA

Academic year 2018-19

Subject's general information

Subject name	POLYMERS AND PROTEINS
Code	102353
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Not informed	4	OPTIONAL	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRALAB	PRAULA	TEORIA
Number of credits	1	2	3
Number of groups	1	1	1

Coordination	MORERA PRAT, JOSEP MARIA
Department	CHEMISTRY
Teaching load distribution between lectures and independent student work	60 hours classroom lessons Self study 90 hours
Important information on data processing	Consult this link for more information.
Language	Català
Distribution of credits	3 teoria, 2 praula, 1 pralab

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
MORERA PRAT, JOSEP MARIA	josepmaria.morera@udl.cat	6	

Subject's extra information

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Laboratory gown from UdL
- Protection glasses
- Mechanical protection gloves

They can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos
Centre the Cultures i Cooperació Transfronterera

http://www.publicacions.udl.cat/

There will be a specific service for the *Campus Universitari d'Igualada*.

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratoy gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: http://www.sprl.udl.cat/alumnes/index.html

Learning objectives

At the end of the course the student should be able to:

-Remember and apply correctly the main types of organic reaction mechanisms involved in the chemistry of proteins and polymers.

-Classify proteins.

-Classify and name the main types of amino acids.

-Explain the acid-base properties of amino acids.

-Explain and correctly calculate the isoelectric point of amino acids.

-Explain peptide bonds and disulfide bonds.

-Identify and explain the primary, secondary, tertiary and quaternary structures of proteins

-Classify the synthetic polymers

-Describe different polymerization processes

-Identify different polymeric materials used in the industry.

-Planify the synthesis of a polymer.

-Analise different types of polymers to determine their physical, structural and chemical properties.

Competences

Basic

B03 That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.

B04 That students can transmit information, ideas, problems and solutions to a specialized and non-specialized public.

B05 That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

Transversal

CT5. To apply essential notions of scientific thinking.

General competences

CG4. To sSolve problems with initiative, make decisions, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Organization Engineering.

Specific competences

CE15. To apply the basic knowledge of production and manufacturing systems.

CE20. To analyze, design, simulate and optimize processes and products.

Subject contents

1. Amino acids. Nomenclature and acid-base properties.
2. Peptide bonds and disulfide bridges.
3. Peptides
4. Proteins Classification and structure
5. Introduction to polymeric materials.
6. Structure, conformation and morphology of polymers.
7. Physical, structural and chemical properties of polymers.
8. Application of polymers.

Methodology

- Master classes. Theoretical explanation reinforced with examples.

- Problems. Discussion and correction of exercises proposed at home. The exercises will be provided to the student in a dossier.

- Practices. In the laboratory for groups. Each group will have to submit a report.

- Written evidence. Exercise resolution by the student individually.

Development plan

Week	Methodology	Content	Classroom hours	Self study hours
1-8	Classroom lessons/problems	Subjects 1-5	32	55
9	Exam	Subjects 1-5	2	
10-13	Classroom lessons/problems	Subjects 6-8	14	25
13-15	Laboratory practices	Laboratory practices	10	15
16	Exam	Subjects 6-8	2	

Evaluation

In the middle of the course there will be an eliminatory midterm exam. At the end of the course there will be a second midterm exam and an final exam. At the end of the course the student who passed the first midterm exam will have the possibility of taking the second midterm exam or doing the final exam. The student who has suspended the first midterm exam may only take the final exam. Each midterm exam will be worth 40% of the final mark of the subject and the final exam will be 80%.

The student who suspends may opt for a recovery test in the established data.

The exercises presented and evaluated and the practices (work in the laboratory + report) will weigh 20% of the final mark of the subject

Bibliography

Basic:

Bruice, Paula Yurkanis. Química orgánica. 5ª. Naucalpan de Juárez, MX: Pearson Prentice Hall, 2008. ISBN 9789702607915.

Wade, L. G; Montaña Pedrero, Ángel-Manuel. Química orgánica. 5ª ed. Madrid, [etc.]: Pearson Educación, cop. 2004. ISBN 9788420541020.

Horta Zubiaga, Arturo. Macromoléculas. Madrid: Universidad Nacional de Educación a Distancia, 1991. ISBN 8436226623.

Pacios, Esteban [et al.]. Laboratorio de macromoléculas y técnicas de caracterización de polímeros. Madrid: Universidad Nacional de Educación a Distancia, 2000. ISBN 8436239458.

Areizaga, Javier [et al.]. Polímeros. Madrid: Síntesis, 2002. ISBN 8497560264.

Szycher, Michael. Szycher's handbool of polyurethanes. Boca Raton: CRC, 1999. ISBN 9780849306020.

Rosen, Stephen L. Fundamental principles of polymeric materials. 2nd. New York [etc.]: John Wiley and Sons, 1993. ISBN 0471575259.

Seymour, Raimond B.; Carraher, Charles E. Introducción a la química de los polímeros. Barcelona [etc.]: Reverté, 1995. ISBN 8429179267.

Crompton, Thomas Roy. Analysis of polymers: an introduction. Oxford: Pergamon Press, 1989. ISBN 0080339360.

Llorente Uceta, Miguel Ángel; Horta Zubiaga, Arturo. Técnicas de caracterización de polímeros. Madrid: Universidad Nacional de Educación a Distancia, 1991. ISBN 8436226100.

Ege, Seyhan N.. Química orgánica : estructura y reactividad. Barcelona [etc.]: Reverté, 1997. ISBN 8429170634 (V. 1).

Vollhardt, K. Peter C.; Schore, Neil E. Química orgánica. Barcelona: Omega, 1996. ISBN 8428208824.

Streitwieser, Andrew; Heathcock, Clayton H. Química orgánica. 3ª. México [etc.]: McGraw-Hill, 1989. ISBN 8476053533.

Complementary:

Brydson, John Andrew. Plastics materials. 7th. Oxford: Butterworth-Heinemann, 1999. ISBN 0750641320.

Gnauck, Bernhard; Fründt, Peter. Iniciación a la química de los plásticos. Barcelona: Hanser, 1992. ISBN 8487454054.

Painter, Paul C; Coleman, Michael M. Fundamentals of polymer science : an introductory text. 2nd. Lancaster [etc.]: Technomic, 1997. ISBN 1566765595 (CART.).

Cowie, John McKenzie Grant. Polymers : chemistry and physics of modern materials. 2nd. Glasgow ; London: Blackie, 1991. ISBN 0216929806 (GRAN BRETANYA).

Gruenhald, Geza. Plastics: how structure determines properties. Munich [etc.]: Hanser, 1993. ISBN 3446165207.

Odian, George G. Principles of polymerization. 4th. Hoboken, N.J.: Wiley-Interscience, 2004. ISBN 0471274003.

McCrum, N.G.; Buckley, C.P.; Bucknall, C.B. Principles of polymer engineering. 2nd. Oxford [etc.]: Oxford University Press, 1997. ISBN 0198565267.

Barth, Howard G.; Mays, Jimmy W. Modern methods of polymer characterization. New York: J. Wiley, 1991. ISBN 0471828149.

Brandrup, J.; Immergut, E.H.; Grulke, E.A. Polymer handbook. 4th. New York: Wiley, 1999. ISBN 0471166286.