

Degree	Type	Year
Biological and Environmental Engineering	OB	1

Contact

Name: Marina Guillen Montalban

Email: marina.guillen@uab.cat

Teachers

Oscar Enrique Romero Ormazabal

Marina Guillen Montalban

Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

Basic knowledge of:

- Protein structure
- Biochemistry
- Catalysis
- Kinetic enzyme
- Microbial growth
- Cell biology
- Chemical Engineering principles

Objectives and Contextualisation

The objective is to present biocatalysis and its fields of application as an alternative to classical catalysis. The knowledge of biocatalysts will be deepened as the central axis of a transformation and of the aspects of engineering of the main elements that make up biotransformation, such as the biocatalyst, the reaction medium, the bioreactor and its operation. Moreover, the classification and study of different biotransformations according to the biocatalyst used will be analyzed in different case studies. The final objective is to be able to define the main elements of a biotransformation and to design a biocatalytic process.

Learning Outcomes

1. CA21 (Competence) Design a biocatalytic process for its industrial application, integrating the state of the art of biocatalysis, its fields of application and the different relevant types of biotransformation.
2. CA21 (Competence) Design a biocatalytic process for its industrial application, integrating the state of the art of biocatalysis, its fields of application and the different relevant types of biotransformation.
3. CA22 (Competence) Summarise and interpret, in a logical and reasoned manner, information from biodegradability or molecular biology studies.
4. KA18 (Knowledge) Distinguish between the fundamental concepts of Chemical Engineering in the different forms of reactor design and operation, including catalytic reactors and with special emphasis on reactors with immobilised biological catalysts.
5. KA19 (Knowledge) Distinguish the different reaction media used in biotransformations and select the appropriate reaction media.
6. KA20 (Knowledge) Distinguish the methods for immobilising biocatalysts and for characterising the immobilised biocatalyst.
7. KA21 (Knowledge) Identify multienzymatic processes.
8. SA23 (Skill) Calculate the main elements involved in biotransformation, such as the biocatalyst, the reaction medium, the bioreactor and its operation.

Content

Assignment program:

- Topic 1 Introduction to biocatalysis
- Topic 2 Biocatalysts
- Topic 3 Biocatalyst engineering
- Topic 4 Reaction medium engineering
- Topic 5 Bioreactor operation
- Topic 6 Biotransformations: case studies

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Seminars and case studies	6	0.24	CA21, CA22, KA18, KA19, KA20, KA21, SA23, CA21
Theoretical classes	49	1.96	KA18, KA19, KA20, KA21, KA18
Type: Autonomous			
Carry out work on a case study	20	0.8	CA21, CA22, KA18, KA19, KA20, KA21, SA23, CA21
Individual study	127	5.08	CA21, CA22, KA18, KA19, KA20, KA21, SA23, CA21
Search for documentation and bibliography	20	0.8	CA21, CA22, KA18, KA19, KA20, KA21, SA23, CA21

Directed activities:

- Theoretical lectures: Master classes on the concepts of the subject

- Seminars: Presentation to students of different cases of study of biotransformations and applied biocatalysis extracted from the bibliography
- Public presentation of the work: Students will orally and publicly present a summary of the most relevant results of the work and deliver the presentation to the professor in digital format through the virtual campus

Communication with Students

Communication with students will take place via the Moodle Classroom on the Virtual Campus.

Autonomous activities:

- Individual study: Individual study, preparation of diagrams and summaries.
- Documentation and bibliography search: Consultation of the bibliographic and documentary sources essential for the course.
- Realization of a work: work in groups of 2-4 students in which each group will elaborate a written work on a case study previously selected by the teacher. The work will be delivered to the teacher in paper format (printed) and in digital format through the virtual campus, in order to discuss in seminars and written presentation.

Informative Note:

The teaching staff must allocate approximately 15 minutes of one class to allow students to complete the evaluation surveys on teaching performance and on the course or module.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Oral and public presentation of the work	10%	1	0.04	CA21, CA22, KA18, KA19, KA20, KA21, SA23
Partial exam (themes 1, 2 and 3)	35%	1	0.04	KA18, KA20, KA21
Partial exam (topics 4, 5 and 6)	35%	1	0.04	CA21, KA18, KA19, KA20, KA21, SA23
Written work	20%	0	0	CA21, CA22, KA18, KA19, KA20, KA21, SA23

Scheduled evaluation process and activities

Throughout the course different evaluation activities will be carried out that will lead to the final grade of the subject obtained by continuous evaluation. Specifically, the evaluable activities will be:

- Written work in groups on a case study that is 20% of the final grade.
- Oral and public presentation of the written work that is 10% of the final grade
- Attendance at all oral presentations is compulsory for all students
- Partial exam of topics 1, 2 and 3, which represents 35% of the final grade
- Partial examination of topics 3, 4 and 5, which represents 35% of the final grade

The written work and the oral presentation of the assignment are not eligible for resit.

The course is considered passed if the average of the 4 activities is 5 or higher. To calculate the average, each activity must have a grade of 4 or above.

If the average of the 4 activities is below 5, or any of the components has a grade below 4, the failed activities (those with less than 5) must be retaken, except for the assignment and the oral presentation, which cannot be resubmitted.

Any of the following circumstances will result in a grade of "Not assessable" for the course:

- Not submitting the written assignment
- Not doing the oral presentation of the assignment
- Not taking one of the exams

Programming evaluation activities

At the beginning of the subject groups will be formed to do the written work. The delivery of written work and oral presentations will be communicated through the virtual campus.

Recovery process

The student can apply for recovery whenever he has submitted to a set of activities that represent at least two thirds of the total grade of the subject. Of these, students who have on average of all the activities of the subject a grade higher than 3.5 may be presented in the recovery.

The partial exams are eliminatory, therefore, a student who has passed a partial exam will not be able to appear for the recovery of this exam. You will have to compulsorily recover those partial exams where the student has obtained a grade lower than 4 regardless of the average obtained according to the calculation of the section "Process and programmed evaluation activities"

The calculation of the grade will be done in the same way as in the continuous evaluation

Procedure for review of qualifications

For each evaluation activity, a place, date and time of revision in which the student can review the activity with the teacher will be indicated. In this context, claims may be made on the activity grade, which will be evaluated by the faculty responsible for the subject. If the student does not appear in this review, this activity will not be reviewed later.

Ratings

Granting a grade of honor registration is the decision of the faculty responsible for the subject. The regulations of the UAB indicate that MH can only be granted to students who have obtained a final grade equal to or greater than 9.00. You can grant up to 5% of MH of the total number of students enrolled.

Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures deemed appropriate, the irregularities committed by the student that may lead to a variation of the grade of an evaluation act will be scored with a zero. Therefore, copying, plagiarism, cheating, letting copy, etc. in any of the evaluation activities will involve suspending with a zero. The evaluation activities qualified in this way and by this procedure will not be recoverable. If it is necessary to pass any of these evaluation activities to pass the subject, this subject will be suspended directly, without the opportunity to recover it in the same course. In this situation the final grade that will be reflected in the minutes will be a 2.

IA is not allowed.

Evaluation of repeating students

There is no provision for a different evaluation system for repeating students.

Unique Assessment
This subject does not offer single assessment.

Bibliography

Books:

Immobilized Biocatalysts

Peter Grunwald (Ed.)

Pages: 510

Published: November 2018

ISBN 978-3-03897-318-8 (Pbk); ISBN 978-3-03897-319-5 (PDF)

<https://doi.org/10.3390/books978-3-03897-319-5>

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<https://www.mdpi.com/books/pdfview/book/861>

Biocatalysis for Green Chemistry and Chemical Process Development

Editor(s): Junhua (Alex) Tao, Romas Kazlauskas

First published:12 April 2011

Print ISBN:9780470437780 |Online ISBN:9781118028308 |DOI:10.1002/9781118028308

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<https://onlinelibrary-wiley-com.are.uab.cat/doi/book/10.1002/9781118028308>

Carrier-bound Immobilized Enzymes: Principles, Application and Design

Author(s): Dr. Linqiu Cao

First published:29 September 2005

Print ISBN:9783527312320 |Online ISBN:9783527607662 |DOI:10.1002/3527607668

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https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991010341558406709

Green Biocatalysis

Editor(s): Ramesh N. Patel

First published:13 May 2016

Print ISBN:9781118822296 |Online ISBN:9781118828083 |DOI:10.1002/9781118828083

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https://cataleg.uab.cat/iii/encore/record/C__Rb2087415?lang=cat

Autor	Fersht, Alan, 1943-
Títol	Enzyme structure and mechanism / Alan Fersht
Edició	2nd. ed.
Publicació/producció	New York : W.H. Freeman, cop. 1985
Descripció	xxi, 475 p.; 24 cm
Matèria	Enzims
ISBN	0716716143
	0716716151 (pbk.)

https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991002478739706709

Autor	Dixon, Malcolm
Títol	Enzymes / by Malcolm Dixon and Edwin C. Webb
Edició	3rd ed.
Publicació/producció	London : Longman, 1979
Descripció	XXIII + 1116 p.; 24 cm
Matèria	Enzims

https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991000758989706709

Títol	Enzyme biocatalysis : principles and applications / Andrés Illanes, editor
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Publicació/producció [Dordrecht] : Springer, 2008

Descripció X, 391 p. : ill. ; 25 cm.

Matèria [Enzims -- Biotecnologia](#)

[Enzims -- Síntesi](#)

ISBN 9781402083600

https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991008142159706709

Títol Ingeniería bioquímica/ Francesc Gòdia Casablanques y Josep López Santín (editores) ; Carles Casas Alvero ... [et al.]

Publicació/producció Madrid : Síntesis, DL 1998

Descripció 350 p. : il.; 24 cm

Col·lecció [Ciencias químicas \(Síntesis\). Tecnología bioquímica y de los alimentos](#)

Matèria [Enginyeria bioquímica](#)

ISBN 8477386110

http://cataleg.uab.cat/record=b1425826~S1*cat

Autor [Bommarius, A. S.](#)

Títol Biocatalysis : [fundamentals and applications] / A.S.Bommarius, B.R.Riebel

Publicació/producció Weinheim : Wiley-VCH, 2004

Descripció XXIII, 611 p.; 24 cm

Matèria [Enzims](#)

ISBN 3527303448

https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991010349685006709

Títol Multi-step enzyme catalysis : biotransformations and chemoenzymatic synthesis / edited by Eduardo Garcia-Junceda

Publicació/producció Weinheim : Wiley-VCH ; Chichester : John Wiley, 2008

Descripció 241 p. ; 25 cm

Matèria [Catàlisi](#)

[Enzims -- Biotecnologia](#)

ISBN 9783527319213

http://cataleg.uab.cat/record=b1747444~S1*cat

Títol Immobilization of enzymes and cells / edited by Gordon F. Bickerstaff

Publicació/producció Totowa : Humana Press, 1997

Descripció XIV, 367 p.;23 cm

Col·lecció [Methods in biotechnology ; 1](#)

Matèria [Enzims immobilitzats](#)

[Enzims -- Biotecnologia](#)

[Cèl·lules immobilitzades](#)

ISBN

0896033864

https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991010401253806709

Autor

[Faber, Kurt](#)

Títol

Biotransformations in organic chemistry : a textbook : with 37 figures, 238 schemes and 16 tables / Kurt Faber

Edició

5th revised and corrected ed.

Publicació/producció

Berlin: Springer-Verlag, cop. 2004

Descripció

XI, 453 p. : il; 24 cm

Matèria

[Reaccions químiques](#)

[Química orgànica -- Reaccions](#)

ISBN

3540200975

http://cataleg.uab.cat/record=b1615815~S1*cat

Autor

[Grunwald, Peter](#)

Títol

Biocatalysis : biochemical fundamentals and applications / Peter Grunwald

Publicació/producció

London : Imperial College Press, 2009

Descripció

xvi, 1035 p. : il. ; 24 cm

Matèria

[Enzims -- Biotecnologia](#)

[Biotecnologia](#)

https://cataleg.uab.cat/record=b1778458~S1*cat

Kourist, R. (2015), Biocatalysis in Organic Synthesis. Science of Synthesis, Vol. 1-3. Edited by Kurt Faber, Wolf-Dieter Fessner and Nicholas J. Turner.. Angew. Chem. Int. Ed., 54: 12547. doi:10.1002/anie.201508130

Search engines of scientific bibliography:

Scholar Google: http://scholar.google.es/advanced_scholar_search?hl=en&lr=

Scopus: <http://www.scopus.com/scopus/search/form.url?display=authorLookup>

Scifinder: Software disponible a la UAB

Science Direct: <http://www.sciencedirect.com/science/journals>

ISI Web of Knowledge: <http://www.accesowok.fecyt.es/login/>

Interesting web sites:

Base de dades d'enzims BRENDA: <http://www.brenda-enzymes.info/>

National Center for Biotechnology Information: <http://www.ncbi.nlm.nih.gov/>

ExPASy (Expert Protein Analysis System) Proteomic Server: <http://www.expasy.ch/>

Software

No software

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(SEMm) Seminars (master)	1	Spanish	first semester	afternoon
(TEm) Theory (master)	1	Spanish	first semester	afternoon