COURSE DATA

Data Subject	
Code	33195
Name	Microbiological control in industrial processes
Cycle	Grade
ECTS Credits	4.5
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1102 - Degree in Biotechnology	Faculty of Biological Sciences	4	First term

Subject-matter

Degree	Subject-matter	Character
1102 - Degree in Biotechnology	105 - Microbiological control of industrial processes	Optional

Coordination

Name	Department
FERRER SOLER, SERGIO	275 - Microbiology and Ecology

SUMMARY

The aim of the teaching program of the subject "Microbiological Control Process" is to show the student control systems that are used at industrial level, both from the point of view of microorganisms as formal object (isolation, improvement and conservation) raw materials, monitoring and monitoring of microbial growth, safety, regulatory and critical control points. They are used but not basic concepts that have been taught in other subjects such as "Microbiology", "Biochemistry", "Genetics", "Introduction to Biochemical Engineering", "bioreactors" and "Basic Operations in Biotechnological processes" will be explained, among other . The practical program of this subject is a fundamental objective that the student is able to reproduce the scale of some laboratory applications contemplated in the theoretical program, using methodologies already learned in basic subjects such as "Microbiology", "Molecular Biology "or" Genetics "to achieve the objectives proposed.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

The subject Microbiological Process Control is part of the Degree in Biotechnology of the University of Valencia (Plan 2009). It is a compulsory subject of 4.5 credits part of Module Optional courses alongside other more than 11 subjects are taught in the fourth year of the Bachelor of Biotechnology. It has therefore been preceded by all the compulsory subjects that are basic or fundamental for the student has developed and assimilated basic concepts necessary pa

OUTCOMES

1102 - Degree in Biotechnology

- Poseer y comprender los conocimientos en Biotecnología.
- The ability to apply this knowledge in the professional world.
- Capacidad de interpretar datos relevantes.
- Be able to convey ideas, problems and solutions in the field of biotechnology.
- Develop skills to undertake further study.
- Have abilities for teamwork and cooperation in multidisciplinary teams.
- Have abilities to disseminate and participate in the social debate on aspects related to biotechnology and its use.
- Assimilate the ethical and legal principles of scientific research in biotechnology.
- Know how to design and implement a complete protocol for obtaining and purifying a biotechnological product.
- Conocer las estrategias de producción y mejora de alimentos por métodos biotecnológicos.
- Know and know how to apply the criteria of biotechnological risk assessment.
- Have an integrated view of the R&D&I process from the discovery of new basic knowledge to the development of particular applications of that knowledge and the introduction of new biotechnological products into the market.
- Conocer los diferentes tipos de procesos biotecnológicos asociados a la producción industrial.
- Ser capaz de evaluar las aplicaciones biotecnológicas de los microorganismos.
- Determinar los marcadores moleculares apropiados en procesos de mejora con fines biotecnológicos.

- Diseñar procesos de manipulación y obtención de productos biotecnológicos.
- Analizar a nivel molecular el resultado de la manipulación de un organismo.
- Aplicar soluciones biotecnológicas a problemas medioambientales.
- Diseñar y aplicar aproximaciones biotecnológicas en el campo de la Agroalimentación.

LEARNING OUTCOMES

Know and apply correctly the vocabulary and specific terminology of biotechnology discipline.
Apply previously acquired knowledge to understand the current processes for microbiological control of industrial processes.
Distinguish and identify the various useful organisms for the synthesis of molecules of biotechnological interest.
Knowing what the current trends in research are products of biotechnological interest.
Linking Microbiology, Genetics, Molecular Biology and Physiology Metabolism, IT, Process Engineering, Basic Operations and necessary to understand a bioprocess.
Understand and evaluate control strategies on the production and improvement in the production of metabolites by biotechnological methods.
Furthering the development of manual and mental skills necessary for developing problems or practices that arise.
Being able to detect the approach or procedure errors committed during the laboratory work, and discern the extent that the results have faults committed.
To know and handle the documentary sources of all kinds related to obtaining biotechnology products, with special attention to the basic texts of wide international acceptance and also accessible sources through computer networks.
Acquiring the knowledge base needed to enter the professional work.
Knowing industrial applications and scope of the methods of control of microorganisms, both methods of detection and monitoring as hygiene materials, and equipment surfaces.
Knowing selection strategies of microorganisms and search for new metabolites or activities.
Acquire an integrated view of the R + D + i, from the discovery of new basic knowledge to the development of specific applications of this knowledge and market introduction of new biotech products.

DESCRIPTION OF CONTENTS

1. Introduction

Historical perspective of the control systems of microbial growth in industrial processes

2. Industrial cultivation of microorganisms

Substrates used as culture media. The inoculation of microorganisms in industrial volumes. The problem of scale: large volumes and high inertia. Solid substrates fermentations.

3. Monitoring systems and control of microbial growth in industrial processes

System selection process and depending on the microorganism: direct and indirect methods.

5. Disinfection methods of industrial plants

Control surfaces. Removing microbial spores and biofilms. Concept of "white room". Types of disinfectants and disinfection processes.

6. Methods for detection and control of contaminating microorganisms

Cultural and molecular techniques. Biosensors. Hazard Analysis and Critical Control Point (HACCP). Regulations on methods of microbiological analysis.

7. Case studies

Analyses and solutions

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	31,00	100
Laboratory practices	12,00	100
Tutorials	2,00	100
Development of group work	12,50	0
Development of individual work	10,00	0
Study and independent work	30,00	0
Preparing lectures	12,00	0
Preparation of practical classes and problem	3,00	0
TOTAL	**112,50**	

TEACHING METHODOLOGY

Theoretical contents

The basic theoretical contents of the course will be taught by the teacher using the lecture. Attendance at these sessions is optional for the student while regular monitoring is recommended. During the development of the class, the teacher will invite the students to express their opinion or their strategies on some of the aspects dealt with in the subject. This part does not have a specific qualification, and aims to

involve students through personal contributions to the topic being addressed.

Practical contents

Practices will be developed at three sessions of 4 hours in the laboratory. Attendance is considered mandatory at least 80% of practical hours.

Students take part in the same groups of 2 to 4 according to the practice. Each group will have its own results collected in some worksheets that will provide the teacher through Virtual Classroom and should be completed by each student; Professor will monitor the results. The teacher will monitor and correct the acquisition of skills in each practice session and compile the results of all students and organize the discussion of them in a final session in which students will be invited to draw conclusions from the results obtained by them, taking into account every possible case could occur in the development thereof (handling errors, inconsistency of results, etc.).

Seminars

The teacher will organize students in the class into small groups (3-4 students) to develop a topic for a seminar. They will be asked to provide scientific information sources, informative, media, etc. Each group will have to read the material available to them, summarize, draw conclusions and prepare a presentation of the seminar. They must present the teacher with at least one week in advance of the scheduled date for the submission, the additional material they have gathered, and a summary of the information and the conclusions thereof, together with the presentation in electronic format. The presentation of the seminars will be held throughout the course, and during it will be enhanced and the participation of other students in the group will be asked.

Discussion of case studies

A series of case studies for presentation, discussion and resolution, with the aim that students learn to apply their knowledge to the problems of industrial processes will be presented to students. The teacher will pose questions to students and evaluate their responses.

personalized tutoring

group tutorials: 2 sessions of 1 hour of tutoring in small (16 students) groups will be held. student attendance for guidance on activities related to the subject as the preparation of seminars, discussion directed or development of volunteer work is recommended.

individual learning: A pre-dedication is recommended half hour theory session, to know the contents to be present and, at least 2 hours per week of study to settle knowledge and prepare for the exam.

EVALUATION

It is considered essential for learning assessment conducted by the student direct finding its level through personalized tutoring conducted over the course, which can provide guidance on the state of basic knowledge acquisition through questionnaires, and established relationship with the professor in the lab, and this level of relationship one of the most informative and efficient. This will allow the teacher to establish a direct way a dynamic picture of the evolution over the course of each student, while respecting the maximum number of students per group and subgroups of practice. The numerical rating of knowledge and skills acquired be established, however, to benefit from methods that allow objective and comparable measure thereof, with record results, which involves written test score and job preparation. You need to pass have obtained a minimum of 50 points out of 100 with the following distribution:

Theory: 60 out of 100. Minimum needed to pass the theory: 30 points.

PRACTICES: 25 out of 100.
- Compulsory attendance: entitles examination (minimum 80% of the sessions).
- Review Practices: up to 25 points (minimum 12.5 points: evaluation of practices be overcome independently to the theory).

SEMINARS: 10 points out of 100.
- Implementation, delivery and presentation binding.
- TOTAL seminars: up to 10 points.
- No minimum points to overcome this part

DISCUSSION OF CASE STUDIES: 5 points out of 100.
- No minimum points to overcome this part

After passing each of the parties listed above assessment, the marks obtained will be kept until the second call, if any of the other parts were not surpassed in the first call. There will, therefore, an examination of theory and practical exam on second call, whose qualifications, once overcome both independently rating will add previously obtained in the seminar and other activities, if any.

Second enrollment students (repeaters), they have made the minimum number of practice sessions in the course immediately above may, if they choose, not to attend the contact sessions in the laboratory, and may retain the practical exam score have approved, as long as you credit the responsible teacher last year. This accreditation must be submitted during the month of October the course of study. The other matter assessable activities be performed in their entirety.

REFERENCES

Basic

- Renneberg, R. 2008. Biotecnología para principiantes. A. L. Demain (Ed.) Reverté.

Smith, J. 2009. Biotechnolgy 5th edition. Cambridge University Press.

Kun, L. Y. (Ed.). 2006. Microbial Biotechnology. Principles and applications (2nd edition) World Scientific Press.

Crueger, W. y Crueger, A. 1993. Biotecnología: Manual de microbiología industrial. Editorial Acribia. Zaragoza.

Glazer, A.N. y Nikaido, H. 1998. Microbial Biotechnology. Freeman and Company. New York.

Murooka, Y. Y Imanala, T. (Eds.). 1994. Recombinant microbes for industrial and agricultural applications. Marcel and Dekker, Inc. New York

La información necesaria para la comprensión y desarrollo de las prácticas se encuentra en el cuadernillo de prácticas, disponible en Aula Virtual.

Additional

- Arora, D.K., Elander, R.P. y Mukerji, K.G. 1991. Handbook of Applied Mycology. 5 volúmenes. Marcel Dekker. New York.

Balows, A., Trüper, H.G., Dworkin, M., Harder, W. y Schleifer, K.-H. (Eds.). 1992. The Prokaryotes. Second edition. Springer-Verlag. New York.

Glick, B.R. y Pasternak, J.J. 2003. Molecular Biotechnology. Principles and applications of recombinant DNA. ASM Press. Washington.

Murooka, Y. Y Imanala, T. (Eds.). 1994. Recombinant microbes for industrial and agricultural applications. Marcel and Dekker, Inc. New York

Primrose, S.B. 1991. Molecular Biotechnology. Blackwell Scientific Publications. Oxford.

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Rose, A.H. y Harrison, J.S. (Eds.). 1993. 2nd edition. Yeast Technology (Yeast Genetics, Volume 5) Series: The Yeasts. Elsevier.

The yeasts. 6 volúmenes. Academic Press. Nueva York y Londres.

de Winde, J. H. (Ed.) 2003. Functional genetics of industrial yeast. Series: Topics in Current Genetics Vol. 2. Springer-Verlag. Berlin Heidelberg.

Alonso, E., Ferrer, S., Uruburu, F. y Vicente, E. 1987. Penicillium auxotrophic mutants can be detected by using xanthene dyes. Experientia 43: 206-207.

Doyle, A., Hawksworth, D.L., Hill, R.L., Kirsop, B.E., Komagata, F. y Stevenson, R.E. (Eds.). desde 1988. Living resources for Biotechnology. Cambridge University Press. Cambridge. Se trata de 4 volúmenes dedicados a Yeasts