



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Cell cultures in the production of secondary metabolites [S1IFar2>KKwPMW]

Course

Field of study

Pharmaceutical Engineering

Year/Semester

2/3

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

0

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

A student studying the subject should have basic knowledge of biology, chemistry and physics from high school.

Course objective

The classes are intended to familiarize students with the problems related to the production of substances with biological activity using biotechnological methods. The classes are intended to familiarize students with the problems related to the production of secondary metabolites using biotechnological methods. The topics of the classes will include issues related to the conditions for establishing and conducting in vitro cell cultures in various systems and differences in the biosynthetic potential of cultures. The student will become acquainted with the problems related to methods of conducting cell cultures of microorganisms and plant cells and will learn about the possibilities of the biosynthesis of secondary metabolites in cells and its regulation in in vitro cultures. The student will learn the course of selected biotechnological processes used in the production of specific compounds of importance in pharmacy.

Course-related learning outcomes

Knowledge:

1. Has knowledge in the field of physicochemical and biological foundations of health sciences to the extent appropriate for pharmaceutical engineering, including basic issues included in subjects such as biology, pharmaceutical botany, biotechnology, biochemistry, molecular biology, human anatomy and physiology [K_W5]
2. Has knowledge of the development of pharmaceutical engineering and the research methods used in it, as well as the directions of development of the pharmaceutical industry in the country and around the world [K_W14]
3. Has knowledge of natural and synthetic raw materials, products and processes used in the pharmaceutical industry [K_W13]
4. Has detailed knowledge about substances for pharmaceutical and cosmetic use, dietary supplements, plant raw materials, their production, analysis and quality control, technology and general knowledge about the metabolism and effects of drugs and the correct use of medicinal products, knows the principles of creating a summary of characteristics of a medicinal product and an information leaflet for the patient, knows and understands the rules for authorizing medicinal products, medical devices, cosmetics and dietary supplements, knows the pharmacopoeial requirements for assessing the quality of medicinal substances and products [K_W25]

Skills:

1. Understands the literature on pharmaceutical engineering in Polish; reads and understands simple scientific and technical texts in a foreign language, is able to obtain information from literature, databases and other sources related to pharmaceutical engineering, also in a foreign language, integrate it, interpret it, draw conclusions and formulate opinions [K_U1]
2. Can prepare a well-documented study in the field of pharmaceutical engineering in Polish and a foreign language [K_U5]
3. Can prepare and present, both in Polish and a foreign language, an oral presentation on specific issues of pharmaceutical engineering [K_U6]
4. Has the ability to self-educate [K_U2]

Social competences:

1. Is ready to critically evaluate his knowledge, understands the need for further education, supplementing specialized knowledge and improving his professional, personal and social competences, understands the importance of knowledge in solving problems and is ready to seek the opinion of experts [K_K1]
2. Can think and act in an entrepreneurial way [K_K6]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The exercises end with a written assessment of the subject in the form of test questions (stationary or remote form depending on the epidemiological situation).

Programme content

1. Biotechnological techniques used in the in vitro culture of plant cells and microorganisms for the production of secondary metabolites.
2. Factors influencing metabolite production.
3. Bioreactors.

Course topics

The classes will present various biotechnological techniques used to establish and conduct in vitro cell cultures for the production of secondary metabolites in plant cell and tissue cultures (hairy roots) of medicinal plants and in microbial cell cultures. Factors influencing the accumulation of secondary metabolites in cells, technological treatments increasing their production and the secretion of bioactive compounds into the medium will be presented. Issues related to increasing the scale of production in bioreactors will be discussed.

The student will master the ability to prepare detailed studies of selected biotechnological processes using microorganisms and plant cells, taking into account such issues as: characteristics of cell culture, purpose of production, preparation of cells/organism for the production process, course of the

production process, isolation and purification of the product and its analysis. quality, characteristics of the target product, preparation of a commercial form.

The topics discussed will be the subject of student presentations and discussions.

Teaching methods

Lecture, work with text, multimedia presentations, discussion

Bibliography

Basic:

1. Ratledge C., Kristiansen B (red.) Podstawy biotechnologii , Wyd. Nauk. PWN, 2011.
2. Malepszy S. (red.) Biotechnologia roślin , PWN, 2009.
3. Fiedurek J., Bednarski W. Podstawy biotechnologii przemysłowej , WNT, 2012.
4. Woźny A., Przybył K. Komórki roślinne w warunkach stresu. Tom II. Komórki in vitro. , Wydawnictwo Naukowe UAM, Poznań, 2004.

Additional:

1. Walsh G. Biopharmaceuticals. Concepts and Applications. , John Wiley & Sons, 2007.
2. Kayser O., Muller R. (red.) Biotechnologia farmaceutyczna , PZWL Warszawa, 2003.
3. Kayser O. Podstawy biotechnologii farmaceutycznej , Wydawnictwo Uniwersytetu Jagiellońskiego , 2006.
4. Gad Sh.C. (red.) Handbook of pharmaceutical biotechnology , Wiley, New Jersey, 2007.
5. Fiedurek J. (red.) Podstawy wybranych procesów biotechnologicznych , WNT, 2014.
6. Crommelin D.J.A., Sindelar RD, Meibohm B (eds.) Pharmaceutical biotechnology: fundamentals and applications (Third Edition). , Informa, New York, 2008.
7. Buchowicz J. Biotechnologia molekularna , Wyd. Nauk. PWN, 2012.
8. Bednarski W., Fiedurek J. (red.) Podstawy biotechnologii przemysłowej , WNT, 2009.
9. Scientific journals containing articles on the conduct and application of various cell cultures in biotechnology, Biotechnology, Elsevier, Springer, Wiley, etc.

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50