



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Cell Cultures in Biotechnology - Cell Cultures Used in the Production of Secondary Metabolites by Biotechnological Methods

Course

Field of study

Pharmaceutical Engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

elective

Number of hours

Lecture

0

Tutorials

15

Laboratory classes

0

Projects/seminars

0

Other (e.g. online)

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

prof.dr hab.Barbara Thiem

Responsible for the course/lecturer:

prof.dr hab.Jaromir Budzianowski

Prerequisites

The student should have a basic knowledge on biotechnology, biology, genetics, chemistry, physics

Course objective

Classes aim to familiarize the students with cell cultures that are applied in the production of substances (secondary metabolites) of therapeutic importance, using biotechnological methods. The programme will also provide students with basic knowledge on biotechnological processes employed to obtain



substances with biological or pharmacological activity. The student will become familiar with the methods of conducting cultures of microorganism, animal and plant cells and biosynthesis of secondary metabolites in the obtained biomass. Developing students' skills to obtain information from indicated sources on biotechnology and team cooperation skills.

Course-related learning outcomes

Knowledge

1. has knowledge on natural and synthetic raw materials, products and processes applied in the pharmaceutical industry K_W13 with P6S_WG and P6SI_WG
2. has knowledge on the development of pharmaceutical engineering and research methods used in it, as well as directions of development of the pharmaceutical industry in the country and in the world K_W14 with P6S_WG ; P6SI_WG and P6S_WK
3. has knowledge on the physicochemical and biological foundations of health sciences in the field of pharmaceutical engineering, including basic issues within the scope of subjects such as biology, pharmaceutical botany, biotechnology, biochemistry, molecular biology K_W5 with P6S_WG
4. has detailed knowledge on selected biotechnological processes employed to obtain important substances of pharmaceutical importance K_W24 with P6S_WG and P6S_WK

Skills

1. understands literature in the field of pharmaceutical engineering in Polish; reads and understands uncomplicated 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 them, interpret them, draw conclusions and formulate opinions K_U1 with P6S_UW and P6S_UK
2. is able to prepare and present, both in Polish and in a foreign language, an oral presentation on specific issues of pharmaceutical engineering K_U5 with P6S_UK
3. has the ability to self-study K_U24 with P6S_UO

Social competences

1. is ready to critically assess 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 expert opinions K_K1 with P6S_KK

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired as part of the seminar exercises is verified by the colloquium carried out after the end of the class, on the agreed date. The test consists of 30 test questions. Passing threshold: 60% of



points. Assessment issues based on which questions are prepared will be posted on the WISUS AKSON portal using the university e-mail system

Programme content

The student will learn about the methods of conducting cultures of bacteria, fungi, animal and plant cells used to obtain secondary metabolites. The student will acquire knowledge about the methods of secondary metabolite biosynthesis in in vitro cultures, with various in vitro techniques used to produce secondary metabolites found in medicinal plants. They will learn about the factors affecting their accumulation and technological treatments that increase the production and secretion of bioactive compounds (biofactories). Issues related to the selection of bioreactors for plant cell cultures and hairy roots will be presented. The student will master the ability to prepare detailed studies of selected biotechnological processes based on specific cell cultures, taking into account such issues as: production target characteristics, preparation of cells / organism for the production process, production process with particular emphasis on cell culture conditions (media, physicochemical conditions, etc.), isolating and purifying the product and analyzing its quality. The topics discussed will be the subject of student presentations and discussions.

Teaching methods

Tutorials with multimedia presentation, discussion.

Bibliography

Basic

1. Fiedurek J., Bednarski W. Podstawy biotechnologii przemysłowej. WNT, 2012
2. Malepszy S. (red.) Biotechnologia roślin, PWN Warszawa 2009
3. Ratledge C, Kristiansen B (red.): Podstawy biotechnologii. Wyd. Nauk. PWN, Warszawa 2011.

Additional

1. Buchowicz J.: Biotechnologia molekularna, Wyd. Nauk. PWN, Warszawa 2006, 2012.
2. Crommelin DJA, Sindelar RD, Meibohm B (eds): Pharmaceutical biotechnology: fundamentals and applications (Third Edition). Informa, New York 2008.
3. Fiedurek J. (red.): Podstawy wybranych procesów biotechnologicznych, WNT, 2014.
4. Fiedurek J., Bednarski W. Podstawy biotechnologii przemysłowej. WNT, 2012.
5. Gad Sh. C. (ed.): Handbook of pharmaceutical biotechnology, Wiley, New Jersey 2007.
6. Kayser O.: Podstawy Biotechnologii Farmaceutycznej. Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2006.
7. Kayser O., Müller R. (red.): Biotechnologia farmaceutyczna. PZWL, Warszawa 2003



8. Walsh G.: Biopharmaceuticals. Concepts and Applications. John Wiley&Sons, 2007
9. Woźny A., Przybył K. (red.): Komórki roślinne w warunkach stresu. Tom II. Komórki in vitro. Wyd. Naukowe UAM, Poznań 2004.
10. BioTechnologia - przegląd informacyjny - kwartalnik, Czasopismo wydawane przez Komitet Biotechnologii przy PAN; www.biotechnologia.pl; www.e-biotechnologia.pl
- 11 Other magazines with the word "biotechnology" or "biotechnology" in their nam.

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,0
Classes requiring direct contact with the teacher	20	0,6
Student's own work (literature studies, preparation for tutorials, preparation for tests, preparation for presentation) ¹	10	0,4

¹ delete or add other activities as appropriate