SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Biotechnology of Animal Reproduction

Educational subject description sheet

Basic information

Field of study Biotechnology	**Didactic cycle** 2023/24
Speciality -	**Subject code** BBTBTjS_D.340K.01636.23
Organizational unit Faculty of Biology and Biotechnology	**Lecture languages** english
Study level first cycle (engineering degree)	**Mandatory** Elective subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Biological sciences

Coordinator	Ewa Kautz
Teacher	Ewa Kautz

Period	**Examination**	**Number of ECTS points**
Semester 7	Pass with grade **Activities and hours** Lecture: 15 Laboratory exercises: 15	2

Goals

Code	Goal
C1	The aim of the course is to acquaint students with the techniques of animal reproductive biotechnology. The program contains information about the techniques of assisted reproduction used in animal production.

Entry requirements

Information on molecular biology, cell biology, anatomy, histology, animal embryology, genetics and immunology, as well as familiarity of the cell and tissue culture techniques.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the diagnostic tests and techniques in animal reproductive biotechnology, including preliminary and detailed tests of semen in various animal species	BTj_K3_W01_inz, BTj_K3_W02_inz, BTj_K3_W03, BTj_K3_W06, BTj_K3_W07_inz, BTj_K3_W10, BTj_K3_W13_inz	Written credit
Skills – Student can:			
U1	perform some techniques of obtaining in vivo and producing embryos in vitro, as well as basic endocrinological and immunological laboratory diagnostics	BTj_K3_U06_inz, BTj_K3_U07, BTj_K3_U08_inz, BTj_K3_U11_inz, BTj_K3_U12_inz, BTj_K3_U13_inz, BTj_K3_U14_inz, BTj_K3_U15_inz, BTj_K3_U22	Written credit
Social competences – Student is ready to:			
K1	further acquire knowledge in the field of advanced biotechnology procedures of gametes and embryos used in animal production and in assisted reproductive techniques in the treatment of animal infertility (for high breeding value and those in danger of extinction)	BTj_K3_K01, BTj_K3_K02, BTj_K3_K06, BTj_K3_K07	Written credit

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	The anatomy and physiology of the female and male reproductive systems, participation of the immune and neuroecryological systems as well as genetic factors in the reproductive function. The sperm-oocyte interaction, fertilization mechanisms, embryonic development, implantation and pregnancy. The basics of reproductive biotechnology. The production of animal embryos in vivo and in vitro, artificial insemination of animals, embryo transfer, micromanipulation of oocytes and embryos, principles of gamete and embryo cryobiology, applied biotechnological techniques such as cloning, and genomics of gametes and embryos.	W1, U1, K1	Lecture

No.	Course content	Subject's learning outcomes	Activities
2.	Laboratory procedures of reproductive biotechnology techniques. The estimation and detailed evaluation of animal semen, oocyte collection procedure, oocyte culture for in vitro maturation (IVM). The sperm selection and in vitro fertilization (IVF) procedures. Laboratory diagnosis of pregnancy after insemination of females of various species. The procedures of cryopreservation of gametes and embryos.	W1, U1, K1	Laboratory exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture
Laboratory exercises	Laboratory (experiment), learning by experiment

Activities	Examination method	Percentage
Lecture	Written credit	50%
Laboratory exercises	Written credit	50%

Activities	Credit conditions
Lecture	colloquium after accomplishment of 50% of practical work and theoretical classes (lectures) and a final exam containing 100% of practical and theoretical material - the possibility of using distance learning when necessary
Laboratory exercises	colloquium after accomplishment of 50% of practical work and theoretical classes (lectures) and a final exam containing 100% of practical and theoretical material - the possibility of using distance learning when necessary

Literature

Obligatory

1. Reproductive Technologies in Farm Animals. I. Gordon, CAB Publishing, 2017
2. Animal andrology : theories and applications. P.J. Chenoweth, S.P. Lorton., CAB International, 2014
3. Biotechnology of animal reproduction. M. Marcondes, K.C. Silva-Santos, L. Simdoes Rafagnin Marinho, Nova Science Publishers, Inc., 2016

Optional

1. Essentials of Domestic Animal Embryology. P. Hyttel, F. Sinowatz, M. Vejlsted, K. Betteridge, Elsevier, 2010
2. Equine Embryo Transfer. Patrick M. McCue, Edward L. Squires, Tenton NewMedia, 2015
3. Advances in Animal Biotechnology, B. Singh, G. Mal, S.K. Gautam, M. Mukesh, Springer Nature Switzerland AG 2019

Calculation of ECTS points

Activity form	Activity hours*
Lecture	15

Laboratory exercises	15
Preparation for exercises	10
Preparation for the exam	10
Student workload	**Hours** 50
Number of ECTS points	**ECTS** 2

* hour means 45 minutes

Effects

Code	Content
BTj_K3_K01	The graduate is ready to proper storage of data, updating and extending knowledge on topics related to biotechnology and the related sciences;
BTj_K3_K02	The graduate is ready to development and application of one’s skills in practice (including communication, teamwork), which enable effective lifelong learning with respect to biological sciences;
BTj_K3_K06	The graduate is ready to presenting justified arguments supporting one’s standpoint regarding scientific, ethical and social topics influencing the progress in biological sciences;
BTj_K3_K07	The graduate is ready to recognising the scope and ethical nature of the effects of utilising biotechnology and its impact on the society; settling ethical dilemmas related to the work of a biotechnologist;
BTj_K3_U06_inz	The graduate can use laboratory equipment in order to gather observations and data
BTj_K3_U07	The graduate can follow proper principles of safety and work ethics during the execution of scientific research using various experimental methods under laboratory and field conditions
BTj_K3_U08_inz	The graduate can assess the social, economic and legal conditions of the activities of a biotechnologist;
BTj_K3_U11_inz	The graduate can able to assess the usefulness of the available methods or devices and propose potentially the best solution when solving a practical problem related to the technological utilisation of biological material;
BTj_K3_U12_inz	The graduate can plan and perform experiments related to the preparation, creation and utilisation of biological material in a production process;
BTj_K3_U13_inz	The graduate can propose analytical methods and plan an experiment for solving engineering tasks related to various stages of creating a biotechnological product;
BTj_K3_U14_inz	The graduate can translate the results of experiments into practical solutions;
BTj_K3_U15_inz	The graduate can design modification of the features of a biological organism and the conditions of a process associated with the multiplication of biological material in accordance with the adopted assumptions, select devices and unit operations related to the extraction, purification and preservation of a bioproduct;
BTj_K3_U22	The graduate can find and assess information from various sources, including from original research, and present in a well organised manner (e.g. essays, reports and laboratory reports);
BTj_K3_W01_inz	The graduate knows and understands technologies of performing biotechnological processes
BTj_K3_W02_inz	The graduate knows and understands basics related to the life cycle of a biotechnological product, as well as devices and their instrumentation (measurement sensors) used in biotechnological production
BTj_K3_W03	The graduate knows and understands key aspects of biotechnology
BTj_K3_W06	The graduate knows and understands the functions of various cells (prokaryotic and eukaryotic), being able to critically explain, how their properties are related to varying biological functions, knowing how they can be tested experimentally
BTj_K3_W07_inz	The graduate knows and understands experimental methods serving the examination of important areas in the field of biotechnology, chemistry, biochemistry, biophysics, molecular biology and the related sciences;
BTj_K3_W10	The graduate knows and understands terms, principles and theories related to processes and mechanisms which have shaped the world of nature, knowing how they can be used efficiently;
BTj_K3_W13_inz	The graduate knows and understands the importance of processes necessary to asses and initiate research in the field of biotechnology;