**SYLLABUS**

**regarding the qualification cycle FROM 2023TO 2024**

1. Basic Course/Module Information

|  |  |
| --- | --- |
| Course/Module title | *In vitro* cultures of plants |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | College of Natural Sciences [Institute of Agricultural Sciences, Land Management and Environmental Protection](http://www.wbr.ur.edu.pl/en/) |
| Name of the unit running the course | Department of Physiology and Plant Biotechnology |
| Field of study | Agriculture, Agroforestry, Landscape Architecture |
| Qualification level  |  |
| Profile |  |
| Study mode | stationary |
| Year and semester of studies | year II -semester III ,year III -semester V , |
| Course type | Course to choosing |
| Language of instruction | English |
| Coordinator |  |
| Course instructor | Dr Marzena Mazurek |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester(n0.) | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | Internships | others | **ECTS credits**  |
| III or V |  |  |  | 30 |  |  |  |  | 5 |

1.2. Course delivery methods

- conducted in a traditional way

- ~~involving distance education methods and techniques~~

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

- pass with a grade

2. Prerequisites

|  |
| --- |
| Basal knowledge of chemistry, plant physiology, and morphology |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

|  |  |
| --- | --- |
| O1 | *Transfer of knowledge about the types of plant in vitro cultures, their conduct**and use in practice* |
| O2 | Expanding of knowledge related to controlling the growth and development of plants in in vitro conditions |
| O3 | Preparing students to conduct research using in vitro plant cultures |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

|  |  |  |
| --- | --- | --- |
| Learning Outcome | The description of the learning outcome defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | * knows and understands the physiology of in vitro cultures, enabling controlling their growth and development,
* know and follow the rules of work in sterile conditions in a laboratory of plants in vitro culture
 |  |
| LO\_02 | * knows and understands the importance of in vitro cultures in improving the efficiency of agricultural production,

conservative and creative breeding, biodiversity maintenance and environmental protection |  |
| LO\_03 | * is ready to plan experiments with the use of plant material in in vitro conditions, selection of nutrient solution components and culture conditions
 |  |

**3.3. Course content (to be completed by the coordinator)**

Classes, tutorials/seminars, colloquia, laboratories, practical classes

|  |
| --- |
| Content outline  |
| 1. In vitro- basal information, definitions ect. |
| 2.. Preparing basal solutions and medium for in vitro culture. Composition of the medium and its impact on the growth and development of plants culture |
| 3. Explants and quality of different type of explants. Preparing explants to create in vitro culture of plants. Establishment new in vitro cultures of plant in sterile conditions. |
| 4. Evaluation of Plant Growth Regulators and their impact on the growth and development of plant in vitro cultures. Passaging the existed plants cultures. |
| 5. Creation of artificial seeds.  |
| 6. Observation of plants culture regeneration |

3.4. Methods of Instruction

*Laboratory classes: designing and conducting experiments*

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

|  |  |  |
| --- | --- | --- |
| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01 | test | classes |
| LO-o2 | observation during classes, report, test  | classes |
| LO-o2 | observation during classes, report | classes |

4.2 Course assessment criteria

|  |
| --- |
|  classes - pass with a grade (all experiments conducting, report preparation of the conducted experiments) |

5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

|  |  |
| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | 30 |
| Other contact hours involving the teacher (consultation hours, examinations) |  5 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) |  90 |
| Total number of hours |  125  |
| Total number of ECTS credits |  5 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

|  |  |
| --- | --- |
| Number of hours |  *-* |
| Internship regulations and procedures |  *-* |

7. Instructional materials

|  |
| --- |
| Compulsory literature:* Plant Propagation by Tissue Culture 3rd Edition. 2008. Volume 1. The Background . Springer
* Hussain A, Qarshi IA, Nazir H and Ullah I. 2012. Plant Tissue Culture: Current Status and Opportunities. Recent Advances in Plant in vitro Culture. InTech. Chapter 1
* Saad A I M and Elshahed AM. 2012. Plant Tissue Culture Media. Recent Advances in Plant in vitro Culture. InTech. Chapter 2
 |
| Complementary literature: * Rihan, Hail Z., Fakhriya Kareem, Mohammed E. El-Mahrouk, and Michael P. Fuller. 2017. "Artificial Seeds (Principle, Aspects and Applications)" Agronomy 7 (4) 71.
* *Ahloowali B.S.1998. In vitro* techniques and mutagenesis for the improvement of vegetatively propagated plants. Current Plant Science and Biotechnology in Agriculture, 32: 293-310
* Sarasan V\*, Cripps R, Ramsay M M., Atherton C, Mcmichen M, Prendergast G, AND Rowntree J K.2006. Conservation in vitro of threatened plants – progress in the past decade. In Vitro Cell. Dev. Biol.Plant 42:206–214
 |

 Approved by the Head of the Department or an authorised person