Appendix No. 1.5 to the Resolution No. 61/2025
of the Rector of the University of Rzeszów

SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2026/2027 TO 2027/2028
ACADEMIC YEAR 2027/2028

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Manufacturing Engineering Herbal Products**
Course/Module code *	
Faculty (name of the unit offering the field of study)	Faculty of Technology and Natural Sciences
Name of the unit running the course	Institute of Agricultural Sciences, Environmental Protection, and Management
Field of study	Agriculture
Qualification level	second-cycle studies
Profile	General academic profile
Study mode	Full-time
Year and semester of studies	Year 1, Semester 2
Course type	Specialization / Agronomy with Agribusiness
Language of instruction	English
Coordinator	dr hab. Maciej Bilek prof. UR
Course instructor	dr hab. Maciej Bilek prof. UR

* - as agreed at the faculty

1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Laboratories	Seminars	Practical classes	Internships	others	**ECTS credits**
2	12		15					2

1.2. Course delivery methods

x- 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

Completed courses: Detailed crop production; Farm organization and economics; Environmental physics.

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

3.1. Course/Module objectives

O1	Familiarizing students with the fundamentals of herbal product manufacturing engineering
O2	Familiarizing students with the role of medicinal plants in economic activity

3.2. Course/Module Learning Outcomes

Learning Outcome	The description of the learning outcome defined for the course/module	Relation to the degree programme outcomes
LO_01	The student understands the functioning of the herbal industry in Poland and Europe, as well as the economic prospects for the production of herbal products	K_W08
LO_02	The student is familiar with the legal framework governing the herbal product market and understands the necessity of ensuring the appropriate quality of manufactured and supplied herbal products	K_W08
LO_03	The student is able to commission appropriate analyses and subsequently use IT tools to characterize the quality of produced herbal raw materials	K_U02
LO_04	The student is able to analyze issues affecting the cultivation conditions and quality of medicinal plants	K_U06
LO_05	The student is able to analyze rapidly changing trends and the factors influencing the production and use of herbal plants	K_U07
LO_06	The student is prepared to take action to promote the benefits of cultivating and processing herbal plants	K_K03

3.3. Course content

A. Lectures

Content outline
History and current status of herbalism, herbal medicine, and the herbal industry in Poland and Europe. Basic concepts related to herbalism, herbal medicine, and the production and distribution of herbal products. Overview of the profitability of medicinal plant production. Cultivation and harvesting of medicinal plants.
Phytochemical groups of medicinal plants and their pharmacological properties. Cultivation of key medicinal plant species. Methods of obtaining medicinal plants from cultivation and natural sources. Conditions for harvesting and drying herbal raw materials. Storage of medicinal plants.
Methods for assessing the quality and safety of herbal raw materials. Organoleptic, chromatographic, and spectroscopic methods. Characteristics of the market for outsourced laboratory analyses.

Quality systems in herbal production covering cultivation, harvesting, and preliminary processing. Pharmacopoeial requirements and the EMA GACP (Good Agricultural and Collection Practice) system.

B. Laboratories

Content outline
Presentation of medicinal plant cultivation. Overview of basic engineering operations performed on a farm specializing in herbal production.
Familiarization with market opportunities for herbal raw materials in Poland and the Podkarpacie region. Quality standards for herbal raw materials. Analysis of GACP (Good Agricultural and Collection Practices) guidelines and planning herbal crop cultivation tailored to the realities of one's own farm.
Exercises using the *Polish Pharmacopoeia*. Analysis of selected pharmacopoeial monographs regarding the potential cultivation of herbal plants on one's own farm.
Presentation of selected herbal dosage forms obtained through various engineering processes. Presentation of selected herbal raw materials resulting from different grinding and cutting methods.
Presentation of quality control laboratory equipment used in the pharmaceutical and food industries, including an overview of the operating principles and handling of analytical instruments used to assess the quality of herbal raw materials.
Sample preparation and laboratory quality assessment of selected herbal raw materials in accordance with the requirements and methodologies recommended by the *European Pharmacopoeia* and the *Polish Pharmacopoeia*. Testing for: impurities, loss on drying, and swelling index. Comparison of obtained results with pharmacopoeial standards.
Selected testing methods for herbal raw materials according to the *European Pharmacopoeia* and the *Polish Pharmacopoeia*. Preparation of samples for laboratory analysis and assessment of the color intensity of corn poppy flowers based on the drying technique employed; comparison of results with pharmacopoeial standards.
Laboratory assessment of the color (CIE L*a*b* scale) of herbal raw materials (specifically flowers) listed in the European Pharmacopoeia and the Polish Pharmacopoeia, in relation to drying temperature.

3.4. Methods of Instruction

Lecture: lecture with a multimedia presentation,
Laboratory: experiment design, 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	Lectures
LO-02	Test	Lectures
LO-03	Test, in-class observation	Laboratory

LO-04	Oral presentation, test	Laboratory
LO-05	Oral presentation, test	Laboratory
LO-06	in-class observation	

4.2 Course assessment criteria

Lecture: pass/fail or test. Tutorials: graded pass. A passing grade for the course is determined by the test results and an oral presentation on a selected topic. The grade for the test is based on the number of points obtained (>50% of the maximum score): satisfactory (dst) 51%, satisfactory plus (dst plus) 61%, good (db) 71%, good plus (db plus) 81%, very good (bdb) 91%. To pass the course, all intended learning outcomes must be achieved.

5. Total student workload needed to achieve the intended learning outcomes – number of hours and ECTS credits

Activity	Number of hours
Course hours	**27**
Other contact hours involving the teacher (consultation hours, examinations)	**10**
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	**18**
Total number of hours	**55**
Total number of ECTS credits	**2**

* 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: materials provided by the teacher and online resources on the topics covered
Complementary literature: online resources on the topics covered

Approved by the Head of the Department or an authorised person