**SYLLABUS**

**regarding the qualification cycle FROM 2024 TO 2025**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | Plant-based food analytics |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | College of Natural Sciences |
| Name of the unit running the course | Institute of Food Technology and Nutrition |
| Field of study | Food technology and human nutrition |
| Qualification level |  |
| Profile | General academic |
| Study mode | Part-time |
| Year and semester of studies | Summer semester |
| Course type | Erasmus+ program |
| Language of instruction | English/Italian |
| Coordinator | Agata Pawłowska PhD |
| Course instructor | Agata Pawłowska PhD |

\* - 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** |
| Summer |  |  |  | 30 |  |  |  |  | 5 |

1.2. Course delivery methods

- conducted in a traditional way

1.3. Course/Module assessment

- pass with a grade

2. Prerequisites

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| Completed course: general chemistry, food chemistry, food analysis, general food technology |

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

3.1. Course/Module objectives

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| --- | --- |
| O1 | Presentation of physical and chemical methods of analysis of plant raw materials and food of plant origin. |
| O2 | Presentation of specialized analytical equipment used for the analysis of raw materials and plant-based foods. |
| O3 | Familiarizing students with the principles of performing qualitative and quantitative analysis of raw materials and food of plant origin. |
| O4 | Presentation of the principles of proper selection of the analytical method for individual types of raw materials and the qualitative and quantitative parameters analysed. |
| O5 | Acquisition of practical skills in quantitative and qualitative analysis of raw materials and food of plant origin. |

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 | Student knows and understands the basics of physico-chemical phenomena used in raw material and plant-based food analysis. | K\_W01 |
| LO\_02 | Student knows and understands the construction and operation of the measuring apparatus. | K\_W01 |
| LO\_03 | Student is able to properly plan analyses and select appropriate apparatus used in the food analysis. | K\_U03 |
| LO\_04 | Student is ready to deepen his/her knowledge in order to improve their professional competence and to solve the tasks on his/her own. | K\_K02 |

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

1. Lectures
2. Laboratories

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| Content outline |
| The use of spectroscopic methods in instrumental analysis. Spectrophotometric color measurement and spectrophotometric determination of anthocyanins in raw materials and food of vegetable origin. |
| Spectrophotometric method for the determination of vitamin C in plant-based foods. |
| Spectrophotometric determination of polyphenols and flavonoids in raw materials and plant-based foods. |
| Methods of extraction of plant material and methods of extraction of individual substances of plant origin. Accelerated solvent extraction, solid-phase extraction. |
| Determination of antioxidant properties by ABTS, DPPH and FRAP methods. |

3.4. Methods of Instruction

Laboratory: performing experiments, designing experiments, working in groups**.**

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 | Reports, observation during classes, colloquium | Lab |
| LO-o2 | Reports, observation during classes, colloquium | Lab |
| LO-o3 | Reports, observation during classes | Lab |
| LO-o4 | Reports, observation during classes | Lab |

4.2 Course assessment criteria

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| Forms of assessment: laboratory work report and colloquium.  The grade of the subject is determined by the total points of the colloquium and report.  Passing exercises (> 50% of the maximum number of points): satisfactory 51-59%, satisfactory plus 60-69%, good 70-79%, good plus 80-89%, very good> 90%.  Requirement is to reach all learning outcomes. |

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) | 20 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 75 |
| 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

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

7. Instructional materials

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| Compulsory literature:  1. Obiedziński M (red.) Wybrane zagadnienia z analizy żywności. SGGW, Warszawa, 2009.  2. Silverstein R.M. Spektroskopowe metody identyfikacji związków organicznych. PWN, Warszawa, 2007.  3. Fortuna T. (red.) Podstawy analizy i oceny jakości żywności. UR, Kraków, 2012.  4. Tajner-Czopek A., Kita A. Analiza żywności - jakość produktów spożywczych. AR, Wrocław, 2005. |
| Complementary literature:  1. Sikorski Z. E. (red.) Chemiczne i funkcjonalne właściwości składników żywności. Wyd. 2, WNT, Warszawa, 1996.  2. Cygański A. Metody spektroskopowe w chemii analitycznej. WNT, Warszawa, 1993.  3. Witkiewicz Z. Podstawy chromatografii. WNT, Warszawa, 2005.  4. Hoffmann E. Spektrometria mas. WNT, Warszawa, 1998.  5. Nilsen S. (Ed.) Food Analysis, Food Science Text Series, Springer, 2010.  6. Leo M. L. Nollet: Food Analysis by HPLC CRC Press, 2012.  7. Pawłowska A. M., Żurek N., Kapusta I., De Leo M., Braca A. Antioxidant and antiproliferative activities of phenolic extracts of Eriobotrya japonica (Thunb.) Lindl. fruits and leaves. Plants (Basel). 2023 Sep 10;12(18):3221.  8. Żurek N., Pycia K., Pawłowska A., Potocki L., Kapusta I. T. Chemical profiling, bioactive properties, and anticancer and antimicrobial potential of Juglans regia L. leaves. Molecules. 2023 Feb 20;28(4):1989.  9. Żurek N., Pycia K., Pawłowska A., Kapusta I. T. Phytochemical screening and bioactive properties of Juglans regia L. pollen. Antioxidants (Basel). 2022 Oct 18;11(10):2046.  10. Żurek N, Pawłowska A, Pycia K, Grabek-Lejko D, Kapusta IT. Phenolic profile and antioxidant, antibacterial, and antiproliferative activity of Juglans regia L. male flowers. Molecules. 2022 Apr 26;27(9):2762. |

Approved by the Head of the Department or an authorised person