|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. Course title: **Plant Physiology Laboratory** | | | | | |
|  | | | | |
| 2. Code: | | 3. Type (lecture, practice etc.): practice | | | |
|  | | | | |
| 4. Contact hours: 3 hoursper week | | 5. Number of credits (ECTS): 4 | | | |
|  | | | | |
| 6. Preliminary conditions (max. 3):   * Plant Physiology lecture | | | | | |
|  | | | | |
| 7. Announced:fall semester | | | | | |
|  | | | | |
| 8. Limit for participants: 24 | | | | | |
|  | | | | |
| 10. Responsible teacher (faculty, institute and department):  Marianna Kocsis PhD (Faculty of Science, Institute of Biology, Department of Plant Biology) | | | | | |
|  | | | | |
| 11. Teacher(s) and percentage: | | Marianna Kocsis | | 100% | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | | | | |
| 12. Language:English | | | | | |
|  | | | | |
| 13. Course objectives and/or learning outcomes:  The main objectives of the course are to perform a series of laboratory exercises intended to familiarize students with core concepts and techniques in plant physiology. Emphasis will be placed on water relation of plants, photosynthesis, enzymes and secondary metabolites. The processes will be examined at biochemical, cellular and organismal level in order to provide a more complete understanding of the process.  The exercises in this course increase the appreciation of students for plants and their complex nature, increase their understanding of how plants function. The students will also learn basic data analysis techniques and how to interpret results from simple experiments.  Learning outcomes:  Students understand the following content areas in plant physiology: plant water relations; plant cell structure; photosynthetic processes; enzyme activity; secondary metabolites and the antioxidant defense systems. They have the knowledge of specific laboratory skills including refractometry, microscopy, spectrophotometry, chromatography. Students recognize concepts and theories that explain processes involved in the functioning of plants and relate this understanding to real-world occurrences. They understand and evaluate experimental design, use common techniques and equipment in physiological studies, organize and record experimental data by keeping a laboratory notebook, and report results in a scientific manner. | | | | | |
|  | | | | |
| 14. Course outline   1. General laboratory safety rules 2. Leaf water potential measurements by pressure chamber method, Stress condition survey of grapevine cultivars based on chlorophyll fluorescence measurements 3. Relative water content of plant leaves from different habitats, Actual and critical water content of a mesophytic plant 4. Measurement of osmotic pressure in plant cell, Observation of different type of plasmolysis 5. Hill-reaction 6. Characterization of chloroplast pigments, determination of total chlorophyll content, Catalase enzyme activity 7. Test I. 8. Identification of secondary metabolites I: alkaloids, flavonoids - anthocyanins 9. Identification of secondary metabolites II: polyphenolics, flavonoids - flavonols, Determination of sugar content 10. Measurement of antioxidant capacity 11. Germination ability of seeds, Peroxidase and polyphenol oxidase enzyme activities 12. Measurement of ascorbic acid from fruit, Peroxidase activity with test-tube experiments 13. Test II. 14. Evaluation of the semester | | | | | |
|  | | | | |
| 15. Mid-semester works  Week 3-6 Knowledge of the practical material to be performed based on the electronic handout  Week 7 Test (knowledge of the 2-6th weeks)  Week 8-11 Knowledge of the practical material to be performed based on the electronic handout  Week 12 Evaluated practice  Week 13 Test (knowledge of the 8-12th weeks) | | | | | |
|  | | | | |
| 16. Course requirements and grading  Evaluation of the course based on:   * written exams (test I and II): 50%; * laboratory notebook: 25%; * evaluated practice: 15%; * team and individual work: 10%   Grades:   * 0-54% fail * 55% acceptable * 65% average * 75% good * 85% excellent   None of the above mentioned criteria can be inadequate. An opportunity is provided for improving the exams. | | | | | |
|  | | | | |
| 17. List of readings   1. Protocols and short theoretical backgrounds for the laboratory work can be found on the e-learning site, accessible only for students taking part on the course. | | | | | |
|  | | | | |
| 18. Recommended texts, further readings   1. Taiz, L., E. Zeiger, I.M. Moller, and A. Murphy (2015): Plant Physiology and Development, 6th Edition. Sinauer Associates, Sunderland, MA 2. Hopkins W.G., Hüner N.P.A. (2008): Introduction to Plant Physiology, Wiley-Sons Inc., USA | | | | | |
|  | | | | |
| **Date** | 27th April, 2017 | **Prepared by** |  | | |
| Marianna Kocsis, PhD  responsible instructor | | |
|  | | | | |
| **Endorsed by** | | |  | | |
|  | | |