Edible, medicinal and poisonous mushrooms,

(Mushrooms in Global health)

- short, credit bearing course -

General information

Number of ECTS: 5
Language: English
Modality: Blended
Proposed period: April-May 2027
Duration: 4 days online and 3 days onsite sessions
Target groups: undergraduate, master and PhD students
Number of Participants: 35
Prerequisites: motivation letter

Lecturers: **Dr Maja Karaman**, Full Professor, Faculty of Sciences, University of Novi Sad

PhD Pierre Le Pogam-Alluard, Faculté de Pharmacie, Université Paris-Saclay

Learning outcomes

The course **Edible, medicinal and poisonous mushrooms** is created with an aim to familiarize students with the importance of mushrooms as a specific group of organisms from the aspect of their use in nutrition and healing treatment (as functional food), but also as a group of eukaryotic organisms that produce specific toxins and thus poses a threat to a human health.

The course is develope to give students the basic biological and ecological knowledge about mushroom species in nature but also on importance of recognizing them due to appllying this skill for using specific mushrooms in a diet with a special attention given to the healing properties of selected medicinal mushroom species. The course is dediacted to the specific following objectives: 1) Identification of main genera/species of edible, medicinal and poisonous species from nature by introducing students with basic morpho-anatomical and biochemical characteristics of fruiting bodies (from the field); 2) recognition and identification of the most important genera/species of poisonous toxic mushrooms, including hallucinogenic with the special attention given to the biochemical structure of toxic substances and their effects on a humans health, 3) Identification of poisoning syndrome and first aid procedures, 4) Understanding the importance of using mushrooms in a everyday diet - nutritional values and a source of healthy food (vitamins, minerals, essential amino acids, ballast non-viable components) 5) preparing procedures for using mushrooms as a dietary supplements (beverages, tinctures, etc.) to improve health

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The activities are divided into four categories:

1. Lectures

2. Interactive discussion with participants through the seminar work on site

3. Laboratory exercises - one day 4h

4. Fieldwork - one day – 6h

Syllabus: The lectures will demonstrate the latest scientific knowledge about the following topics: Life strategies and the importance of mushrooms/fungi in nature; Nutritional values of mushrooms; Medicinal properties of mushrooms; The most important species of edible and poisonous mushrooms; Mushrooms grown for commercial use; Mechanisms of toxins produced by mushrooms; False and mild mushroom poisoning; An additional focus of the training is to familiarize participants with the knowledge of the most important poisoning syndromes: phalloidin, orellanin, gyromitrin, muscarin, pantherin, psilocybin, coprinus syndrome, paxillus syndrome, gastrointestinal syndromes; Heavy metals, radioactive elements and other toxic, substances in wild growing mushrooms. A special lecture will be devoted to the conservation of mushroom species and their habitat in nature.

The participants will learn and practice successful field work - recognition of habitats of edible and poisonous mushroom species and rules of collecting (mushroom hunting), Laboratory work will include determination of selected edible and poisonous mushroom species, preparation of beverages and tinctures based on medicinal mushrooms, recognition of symptoms of mushroom poisoning, first aid procedures and a treatment.

The passing grade of the course will be awarded to the students that have:

1. The knowledge and understanding of
    - ✓ Biology and ecology of edible and poisonous mushroom species
    - ✓ Nutritional values of mushrooms
    - ✓ Medicinal values of mushrooms
    - ✓ Symptoms of poisoning syndromes including hallucinogenic effects
    - ✓ Mechanisms of toxins from mushroom species

2. Competence and skills
    - ✓ To recognize and determine the most important mushroom species from nature
    - ✓ To apply knowledge of nutritional values of mushrooms in a regular diet
    - ✓ To recognize and determine mushroom intoxication and to proceed first aid

3. Judgement and approach
    - ✓ To be able to determine and use some edible wild-growing mushrooms

- ✓ To be able to use adequate knowledge in regular life to improve health and overcome bad nutrition and lowering immunity due to stressing environment
- ✓ To be able to react in the problems of mushroom determination due to intoxication – the most frequent toxicity

Course content

Lectures:

- ✓ Life strategies and the importance of mushrooms/fungi in nature;
- ✓ Nutritional values of mushrooms; Medicinal properties of mushrooms
- ✓ The most important edible and poisonous mushroom species;
- ✓ Mushrooms grown for commercial use;
- ✓ Poisoning syndromes: phalloidin, orellanin, gyromitrin, muscarin, pantherin, psilocybin, coprinus syndrome, paxillus syndrome, gastrointestinal syndromes;
- ✓ Mechanisms of toxins produced by mushrooms; False and mild mushroom poisoning.
- ✓ Hallucinogenic mushrooms. Traditions, Use and Abuse with Special Reference to the Genus Psilocybe
- ✓ Heavy metals, radioactive elements and other toxic, substances in wild growing mushrooms.
- ✓ Conservation of mushroom species and their habitat in nature.

Exercises:

- ✓ Recognition of habitats of edible and poisonous mushroom species and rules of collecting (mushroom hunting),
- ✓ Determination of selected and picked from the field edible and poisonous mushroom species (macrosopic – morphoanatomical analysis of fruiting bodies, types of hymenophore, and microscopic characteristics, spore print and isolation of fungal mycelia for culture collection).
- ✓ Storage of collected of voucher mushroom species, in specific rare and endangered species in the Fungarium of Profungi laboratory of mycology (https://www.pmf.uns.ac.rs/en/research/groups/profungi/)
- ✓ Recipes for preparation of beverages and tinctures based on medicinal mushrooms,
- ✓ Recognition of symptoms of mushroom poisoning, first aid procedures and a toxic syndrome treatment.
- ✓ Mushrooms in Art
- ✓ Mushrooms in Etnomycology

Team Work:

1. Analyzing the Seminar work defense on line (PPT presentation in groups of 2 students or alone based on their specific interest in the field)
2. Resolving quick tests for recognition of mushroom species and poisoning symptoms
3. Making a video clip about mushrooms solving the problems of health for humans and for the nature environment

Course design

The online modules consist of theoretical parts, practice parts, and discussion parts.

1. The theoretical parts are delivered through lectures. The discussion parts are delivered through questions that encourage reflection of the theme chosen by a group of students or one student alone for the seminar work. Students should arrange making their presentation among themselves on specific subject choose by their interest (through talk and writing emails via group emails in order to observe the communication in digital environment by using contemporary scientific database). The practice parts consist of assignments for the students to solve alone or in teams. Teacher-led online introduction and facilitation will be provided. The teams will be formed of the members that do not know each other in order to foster the communication between strangers.

2. Supervision will be provided for all the exercises and the process of team work.

3. All the learning materials, handouts, Ppt presentation will be posted on ZOOM or TRELLO platform

Assessment

Students pass the course when they have completed the online attendance of the lectures, exercises and seminar work in groups or alone.

Grades Marking scale:

Fail (5), E (6), D (7), C (8), B (9), A (10).

Grade (Definition) Points or % out of maximum points.

Characteristic.

A (Excellent, 10) 85-100. A distinguished result that is excellent with regard to theoretical depth, practical relevance, analytical ability and independent thought.

B (Very good, 9) 75-84. A very good result with regard to theoretical depth, practical relevance, analytical ability and independent thought.

C (Good, 8) 65-74. The result is of a good standard with regard to theoretical depth, practical relevance, analytical ability and independent thought and lives up to expectations.

D (Satisfactory, 7) 55-64. The result is of a satisfactory standard with regard to theoretical depth, practical relevance, analytical ability and independent thought.

E (Sufficient, 6) 50-54. The result satisfies the minimum requirements with regard to theoretical depth, practical relevance, analytical ability and independent thought, but not more.

F (U) (Fail, 5) 0-49. The result does not meet the minimum requirements with regard to theoretical depth, practical relevance, analytical ability and independent thought. Some occasional examination elements of the course may have the grading scale pass

Plagiarism is considered to be a very serious academic offence. The University will take disciplinary actions against any kind of attempted malpractice in examinations and assessments. The penalty that may be imposed for this, and other improper practices, includes suspension from the University for a specific period of time. (This is a translation of the course syllabus approved in Swedish in examinations or assessments from the Lund Univ.)

Entry requirements

To be Bachelor/Master/PhD level student of the universities partners in the EUGLOH projects.

Further Information

Nataša Hrabovski, University of Novi Sad, Serbia (natasa.hrabovski@uns.ac.rs)

Required Reading:

1.Chang, S.T. & Miles, P. (2004): Mushrooms– cultivation, nutritional value, medicinal effect and environmental impact, 2 nd Ed., CRC Press, Boca Raton, Florida.

2.Bresinsky, A. & Besl., H. (1990): A Colour Atlas of Poisonous Fungi, Wolfe Publishing Ltd., London, England.

3. Geoff Dann. Edible Mushrooms. 2018. A Forager's Guide to the Wild Fungi of Britain and Europe. ISBN:9780857844590, 0857844598, pp. 528, UIT Cambridge. England.

4. Jordan, M. (1998): The Encyclopedia of Fungi of Britain and Europe, David & Charles, Edinburgh.

5. Courtecuisse, R., Duhem, B. (1995): Mushrooms and Toadstools of Britain& Europe, Collins, London.

6. Phillips, R. (1994): Mushrooms and other Fungi of Great Britain and Europe, Macmillan, London.

7. Laessoe T. Petersen H.J. (2019) Fungi of Temperate Europe, Vol.1 and Vol.2 pp. 1715 ISBN:9780691180373. Princeton University Press. New Jersey, USA.

8. Узелац Б. (2009): Гљиве Србије и Западног Балкана, BGV, Logik, Beograd

9. Biology of Macrofungi (2018). **Ed.** Bhim Pratap Singh, Lallawmsanga, Ajit Kumar Passari. Series Title. Fungal Biology. Springer Nature Switzerland AG. Springer Cham, pp. 406, https://doi.org/10.1007/978-3-030-02622-6. ISBN 978-3-030-02621-9, 05 Feb. 2019