Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
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Bee products (289491)

Nositelj kolegija

izv. prof. dr. sc. Lidija Svečnjak

Opis kolegija

The objective of the course is to introduce students to:
- the basics of honey bee biology
- the tasks that bees perform in the hive, as well as the foraging activities outside the hive,
- the role of bee products (honey, bee pollen/bee bread, propolis, beeswax, royal jelly, bee venom) in the bee colony,
- the chemical composition, physical properties and specificities of bee products,
- the technology of bee product production,
- different types of honey with regard to botanical origin,
- factors that influence honey flow of various plant species and honey bee flora (forage) resources,
- the botanical origin and sensory properties of unifloral types of honey and honeydew honey,
- classical physical-chemical and instrumental analytical methods for determining the authenticity and quality of bee products.

The course program Bee Products will enable students to acquire basic theoretical and practical knowledge on the production, properties and analysis of bee products that are necessary for successful business, especially to companies involved in the production and marketing of honey and other bee products, as well as to family farms, and to provide the basis for further upgrading of knowledge.

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ECTS: **6.00**

Sati nastave: 60
Predavanja: 36
Laboratorijske vježbe: 10
Vježbe u praktikumu: 2
Seminar: 4
Terenske vježbe: 8

Izvođač predavanja

- izv. prof. dr. sc. Lidija Svečnjak
- izv. prof. dr. sc. Saša Prđun
- prof. dr. sc. Mirna Mrkonjić Fuka

Izvođač vježbi

- izv. prof. dr. sc. Lidija Svečnjak
- izv. prof. dr. sc. Saša Prđun

Izvođač seminara

- izv. prof. dr. sc. Lidija Svečnjak

Ocjenjivanje

Dovoljan (2): 60-70 %
Dobar (3): 71-80 %
Vrlo dobar (4): 81-90 %
Izvrstan (5): 91-100 %

Vrsta kolegija

- Graduate studies / Environment, agriculture and resource management (Izborni kolegij, 1. semestar, 1. godina)

Oblici nastave

- Lectures
  Lectures include theoretical explanations of teaching units.
- Laboratory practice/exercises
  Laboratory practice/exercises complement / build on the lecture topics, allowing students to apply and determine theoretical knowledge. They are carried out through exercises in the Laboratory for bee prducts analysis and bee biology at the Faculty of Agriculture.
- Practicum
  Practicum exercises complement / build on the lecture topics in terms of their content., allowing students to apply and determine theoretical knowledge. They are carried out through exercises at the experimental apiary of the Faculty of Agriculture.
- Field work
  Field work complement / build on the lecture topics, allowing students to apply and determine theoretical knowledge. They are carried out by visiting an authorized / accredited laboratory for the analysis of honey and other bee products, and a visit to honey bottling plant.
- Seminars
  Carried out through group or independent work of students under the guidance of the course teacher, by applying previously acquired knowledge and skills, processing available literature dana, and presenting their seminar papers. Seminar papers are thematically assigned according to the student's choice / preferences.

Ishodi učenja i način provjere

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Ishod učenja	Način provjere
Explain the basics of honey bee biology and benefits of apiculture.	Written and oral exam.
Explain the process of honey production (conversion of nectar/honeydew into honey), and describe its chemical composition, physical and antimicrobial properties.	Written and oral exam, seminar paper.
Define and describe types of honey according to botanical origin and recognize defects of honey.	Written and oral exam.
Recognize the specific sensory profiles of unifloral types of honey and honeydew honey, and categorize samples within the same type of honey according to their sensory properties and botanical origin.	Participation in practical work / assignments during classes (exercises), written and oral exam.
Identify the type of honey based on the interpretation of the aggregate results of basic physicochemical analyses, melissopalinological analysis and sensory profiling.	Participation in practical work / assignments during classes (exercises), written and oral exam.
Describe the process of production and processing of beeswax, its application and physicochemical properties.	Participation in practical work / assignments during classes (exercises), written and oral exam, seminar paper.
Describe the chemical composition and properties of other bee products (bee pollen/bee bread, propolis, royal jelly, bee venom).	Participation in practical work / assignments during classes (exercises), written and oral exam, seminar paper.
Describe classical physicochemical and instrumental analytical methods for determining the authenticity (detection of adulteration) and quality of bee products.	Participation in practical work / assignments during classes (exercises), written and oral exam.
Explain the principles of chemical characterization of bee products using the infrared (FTIR-ATR) spectroscopy.	Participation in practical work / assignments during classes (exercises), written and oral exam.
Plan the sequence of activities and select equipment for the production of honey, beeswax, bee pollen/bee bread, propolis, royal jelly and bee venom.	Oral exam.

Način rada

Obveze nastavnika

Delivering lectures (in the form of PowerPoint presentations coupled with active learning methods and time provided for questions and discussion), exercises (laboratory, practicum) and fieldwork; providing instructions for using materials for individual teaching units and instructions for preparing seminar papers; assessing student seminars and written exams; conducting oral exams; consultations outside of class (if required).

Obveze studenta

To attend lectures and exercises, prepare and present seminar paper, pass two partial exams (written), and a final oral exam.

Polaganje ispita

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Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
Attending classes				60	45	1.5
Partial exam I (written)	20 %	<60 % 60-70 % 71-80 % 81-90 % 91-100 %	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		30	1
Partial exam II (written)	20 %	<60 % 60-70 % 71-80 % 81-90 % 91-100 %	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		30	1
Seminar paper	10 %				30	1
Oral exam	50 %	<60 % 60-70 % 71-80 % 81-90 % 91-100 %	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		45	1.5
Total	100 %			60	180	6

Tjedni plan nastave

1. Honey bee biology and Importance of apiculture (L).
2. Honey - origin, composition and properties (L).
3. Honey bee flora (L).
4. Honey types and legislation (L).
5. Seminar I - seminar papers thematically assigned according to the student's choice/preferences (S); Physico-chemical analysis of honey (E / Lab).
6. Melisopalynological analysis of honey (L + E / Lab).
7. Sensory analysis of honey (L); Sensory assessment of honey (Tasting and sensory evaluation of different honey types) (E / Lab).
8. Field work (F) - visit to an accredited laboratory for honey analysis. Introduction to instrumental analytical methods (HPLC, IRMS) used in the analysis of honey and other bee products.
9. Field work (F) - visit to a honey bottling plant (introduction to the technology of honey processing and packaging).
10. Beeswax-production, composition and uses (L); Partial exam I (written).
11. Beeswax adulteration issue (L); Detection of beeswax adulteration by infrared (IR) spectroscopy (E / Lab).
12. Bee pollen / bee bread, propolis, royal jelly and bee venom - chemical composition, properties and the methods of their production (L).
13. Chemical fingerprinting of bee products by infrared (IR) spectroscopy (L); Spectral analysis of bee products (E / Lab).
14. Antimicrobial properties of bee products (L).
15. Technology of bee product production (E); Seminar II (S) - Presentation of seminar papers; Partial exam II (written).

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Obvezna literatura

1. Presentations and other materials provided by teachers.

Preporučena literatura

1. Dietemann, V., Neumann, P., Carreck, N. Ellis, J. D. (Editors). The COLOSS BEEBOOK – Volume III, Standard methods for Apis mellifera product research. International Bee Research Association (IBRA), 2021.
2. International Honey Commission (2009). Harmonised methods of the International Honey Commission. https://www.ihc-platform.net/ihcmethods2009.pdf
3. Persano Oddo, L., & Piro, R. (2004). Main European unifloral honeys: descriptive sheets. Apidologie, 35, 38-81.
4. Piana, M. L., Persano Oddo, L., Bentabol, A., Bruneau, E., Bogdanov, S., & Guyot Declerck, C. (2004). Sensory analysis applied to honey: state of the art. Apidologie, 35, 26-37.
5. Von der Ohe, W., Persano Oddo, L., Piana, L. M., Morlot, M., & Martin, P. (2004). Harmonized methods of melissopalynology. Apidologie, 35, 18-25.
6. Svečnjak, L., Nunes, F. M., Garcia Matas, R., Cravedi, J.-P., Christodoulidou, A., Rortais, A., Saegerman, C. (2021) Validation of analytical methods for the detection of beeswax adulteration with a focus on paraffin. Food control. 120, 107503, 1-13.

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