UNIVERSITATEA DE ŞTIINŢE AGRICOLE ŞI MEDICINĂ VETERINARĂ CLUJ-NAPOCA
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No._____of _____ **USAMV form 0702040322**

SUBJECT OUTLINE

1. Information on the programme

1.1. Higher education institution	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca
1.2. Faculty	Food Science and Technology
1.3. Department	Food Science
1.4. Field of study	Food Engineering
1.5.Education level	Bachelor
1.6.Specialization/ Study programme	Food Control and Expertise
1.7. Form of education	Full time

2. Information on the discipline

2.1. Name of the discipline	Bee Products							
2.2. Course coordinator				Assoc. Prof. eng. Laura Stan, PhD				
2.3. Seminar/ laboratory/ project coordinator				Assoc. Prof. eng. Laura Stan, PhD				
2.4. Year of study	IV	2.5. Semester	**7**	2.6. Type of evaluation	Continuous	2.7. Discipline status	Content[2]	BD
							Compulsoriness[3]	ED

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	2	out of which: 3.2. lecture	1	3.3. seminar/ laboratory/ project	1
3.4.Total number of hours in the curriculum	28	Out of which: 3.5.lecture	14	3.6.seminar/laboratory	14
Distribution of the time allotted					hours
3.4.1. Study based on book, textbook, bibliography and notes					6
3.4.2. Additional documentation in the library, specialized electronic platforms and field					4
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					4
3.4.4.Tutorials					4
3.4.5.Examinations					4
3.4.6. Other activities					0
3.7. Total hours of individual study	22				
3.8. Total hours per semester	50				
3.9. Number of credits[4]	2				

4. Prerequisites (is applicable)

4.1. curriculum-related	Food chemistry, Biochemistry, Food Microbiology, Functional foods
4.2. skills-related	Food Quality Management System.

5. Conditions (if applicable)

5.1. for the lecture	Lecture room, video projector, blackboard. The course is interactive; students can ask questions regarding the content of lecture. Academic discipline requires compliance with the start and end of the course. Any other activities during the lecture are not allowed, mobile phones will be turned off.

5.2. for the seminar/ laboratory/ project	Laboratory for quality control of foods from animal/vegetal origin. The deadline for submitting the laboratory work or project is set by the coordinator of the lab works in agreement with the students. Requests for delayed handed in of the projects are accepted only for objective reasons. Also, in case of late submission of laboratory works or projects, the scores will decrease accordingly with 1 point / day of delay.

6. Specific competences acquired

Professional competences	CP1.Description and application of cpncepts, basic methods and pricinples in quality control of bee products. CP2. Explanation and interpretation of concepts, processes, models and methods used in quality control of bee products C3. Application of qualitative and quantitative methods for quality control of bee products CP4. To apply statistical methods to interpret the data of qualitative determinations. CP5. To work on projects for improvement of bee products' quality. CP6. To plan and organise activities regarding the analysis and quality control of bee products.
Transversal competences	CT.1 To prove resilience, discipline, efficiency and responsibility, as well as work ethics, creativity, common sense and critical thinking problem solving, to identify correlations between technological processes, biochemical processes and changes n the food matrix and sensory quality. CT.2 To involve in research activities and documentation in the field of sensory analysis and prove dedication to improve the sensory quality of foods CT3. To demonstrate the empathic capacities of interpersonal communication and to assume specific attributions in carrying out the group activity as well as the ability of communication and inter-relationship within a team in order to solve or mediate individual / group conflicts, optimal time management.

7. Course objectives (based on the list of competences acquired)

7.1. Overall course objective	Within this discipline, a multidisciplinary vision is approached in order to raise the students' awareness and to help them acquire the quality criteria of bee products. Thus, three main directions with major implications in the quality control of bee products are debated: 1. The effect and implications of beekeeping technologies for beekeeping and bee products quality. 2. Evaluation of the quality of bee products by specific analytical methods. Knowledge of quality parameters according to the European legislation. 3. Quality control of bee products through HACCP.
7.2. Specific objectives	Case studies are presented in which students have the opportunity to develop critical thinking and to identify authentic and adulterated products, to identify potential sources of contamination and to develop a HACCP plan.

8. Content

8.1. LECTURE **Number of hours – 14**	**Teaching methods**	**Notes**
1. The economic, social and cultural importance of beekeeping. European and international beekeeping legislation. **2. Honey.** 2.1. Honey production. Transformation of nectar into honey. Good beekeeping practices for honey production: harvesting, maturation, processing and conditioning of honey. Crystallization of honey. Crystallization defects. Honey types. 2.2. Honey quality control. Physical and chemical attributes of honey. Criteria for identification the honey geographical origin. Criteria honey the botanical origin	Interactive lecture, Examples, applications	1 lecture (2h) 2 lecture (4h)

of honey: melisso-palynology, sensory analysis, analysis of minor compounds. Honey contamination. Honey adulteration. **3. Bee pollen.** 3.1. Bee pollen production and harvesting. Good beekeeping practices for bee pollen production: harvesting, conditioning and preservation. 3.2. Quality control of bee pollen: Physical properties and chemical composition. Fermentation processes and functional properties of pollen. quality parameters, indicators of degradation and contamination. 4. **Bee Bread.** Good beekeeping practices for obtaining bee bread: harvesting, conditioning and preservation. Physical properties and chemical composition. Fermentation processes and functional properties of bee bread. Quality control: quality parameters, degradation and contamination indicators. 5. **Royal jelly.** Good beekeeping practices for obtaining royal jelly, harvesting, preserving, and processing royal jelly. Nutritional properties of royal jelly. Quality control of royal jelly. Methods of adulteration. 6. **Propolis**. Good beekeeping practices in obtaining propolis: propolis harvesting, conditioning, sampling and storage, organoleptic and physico-chemical properties, sampling, quality control of propolis. Applications in the food industry. Methods of adulteration and degradation of propolis. 7. **Beeswax.** Good beekeeping practices in obtaining beeswax: wax extraction and conditioning. Wax contaminants. Physical and chemical properties of beeswax. Sampling, quality control of beeswax. Beeswax adulteration. Applications in the food industry of beeswax and quality criteria for beeswax. 8. **HACCP in beekeeping.** Application of HACCP principles in beekeeping processing units.		1 lecture (2h) 1 lecture (2h) 1 lecture (2h) 1 lecture (2h)

8.2. PRACTICAL WORK **Number of hours – 14**	**Teaching methods**	**Notes**
1. Honey quality control: evaluation of honey maturity indicators (humidity, reducing carbohydrates) 2. Honey quality control: Evaluation of honey freshness indicators - diastase index 3. Quality control of honey: Evaluation of indicators of thermal degradation of honey (pH and free acidity, hydroxymethylfurfural) 4. Honey quality control: evaluation of honey authenticity indicators. Physico-chemical parameters for differentiating floral honey from honeydew honey 5. Honey quality control: evaluation of the botanical origin of honey by mellisso-palynological method. 6. Honey quality control: evaluation of the botanical origin of honey and technological defects through sensory analysis. Classification by quality categories according to the quality standard of honey. 7. Propolis quality control: authenticity indicators (determination of wax content and polyphenol concentration)	Practical evaluation of food samples, discussions, data interpretation	4 lab work (8h) 1 lab work (2h)

8. Pollen quality control: determination of botanical origin by palynological method; determination of humidity, evaluation of biologically active compounds in pollen		1 lab work (2h)
9. Knowledge verification colloquium or project.		1 lab work (2h)

Compulsory bibliography:

1. Handwritten notes
2. Bogdanov S, Book of Honey, ebook, www.bee-hexagon.net
3. Dezmirean D.S., 2007, Tehnologii Apicole Speciale, Ed. AcademicPress
4. EC 100/2001 Directiva consiliului EC privind mierea, Official Journal of European Communities, L 10, 47-52
5. International Honey Commission, 2009, Harmonised Methods of the International Honey Commission, http://www.bee-hexagon.net/files/file/fileE/IHCPapers/IHC-methods_2009.pdf
6. Marghitas L., 2005, Albinele si produsele lor, Ed. Ceres, Bucuresti, Editia a III-a
7. NORMA IRAM-INTA 15935-1 Scheme 1, 2004, Instituto Argentino de Normalización-Subcomité de productos agroalimentarios del NOA. Buenos Aires, Argentina.
8. SEBRAE – Serviço Brasileiro de Apoio às Micro e Pequenas Empresas, 2009, Manual de Boas Práticas Apícolas – Campo, Série Qualidade e Segurança dos Alimentos, Brazilia, http://central3.to.gov.br/arquivo/221865
9. Stan Laura, 2015, Obţinerea şi controlul calităţii produselor apicole – îndrumător de lucrări practice, Ed. Academic Press, Cluj-Napoca
10. Stan Laura, 2018, Obţinerea şi controlul calităţii produselor apicole – manual didactic, Ed. Academic Press, Cluj-Napoca

Optional bibliography:

1. Conway, P. L., Stern, R., Tran, L., 2010, The value-adding potential of prebiotic components of Australian honey, Rural Industries Research and Development Corporation
2. Devillers, J., Pham-Delègue, M. H. (Eds.), 2003, Honey bees: estimating the environmental impact of chemicals, CRC Press
3. Hesse, M., Halbritter, H., Weber, M., Buchner, R., Frosch-Radivo, A., Ulrich, S., Zetter, R., 2009, Pollen terminology: an illustrated handbook, Springer Science and Business Media.
4. James, R.R., Pitts-Singer, T.L., 2008, Bee Pollination in Agricultural Ecosystems, Ed. Oxford Univ. Press
5. Krell, R., 1996, FAO Agricultural Services Bulletin No. 124: Value-added products from beekeeping, Food and Agriculture Organisation
6. Mizrahi, A., Lensky, Y. (Eds.)., 2013, Bee products: properties, applications, and apitherapy, Springer Science and Business Media.

9. Corroborating the course content with the expectations of the epistemic community representatives, of the professional associations and of the relevant stakeholders in the corresponding field

The structure of the courses and laboratories meets the expectations of professional associations and employers in the field. Teachers are active members of the Romanian Apitherapy Association and participate annually in meetings with beekeepers, producers and distributors of bee products, constantly updating the thematic content according to research and market news.

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Assessment of acquired knowledge Knowledge of specific terminology Understanding the importance of traceability in quality control of bee products Knowledge and identification of criteria for evaluating the quality of bee products	Written or oral exam	40%

	Degree of involvement and presence	Project or written report and powerpoint presentation	10%
10.5. Laboratory/seminar	Assessment of practical knowledge and project Ability to apply correctly analytical methods for quality control of bee products Ability to correctly interpret analytical results	Continuous evaluation Final colloquium	25%
	Project or written report and powerpoint presentation		25%
10.6. Minimum performance standards			
Quality criteria of bee products, traceability of bee products. Recognition and sensory characterization of authentic bee products, identification of authenticity and degradation criteria, especially of Romanian honey varieties with impact on the market. Knowledge of the qualitative parameters of honey according to EC 110/2001 and other bee products according to international recommendations. The functional role of bee products in food.			

[1] Education levels- choose of the three options: Bachelor/ * Master/Ph.D.
[2] Discipline status (content)- for the undergraduate level, choose one of the options:- **FD** (fundamental discipline), **BD** (basic discipline), **CS** (specific disciplines-clinical sciences), **AP** (specific disciplines-animal production), **FH** (specific disciplines-food hygiene), **UO** (disciplines based on the university's options).
[3/] Discipline status (compulsoriness)- choose one of the options – **CD** (compulsory discipline) **OD** (optional discipline) **ED** (elective discipline).
[4] One credit is equivalent to 25-30 hours of study (teaching activities and individual study).
[5 / *] Disciplines: AK- Advanced knowledge, CT- Complementary Training, S- Synthesis

Filled in on
10. 09. 2021

Course coordinator
Assoc. Prof. eng. Laura Stan, PhD

Seminar coordinator
Assoc. Prof. eng. Laura Stan, PhD

Subject coordinator
Assoc. Prof. eng. Laura Stan, PhD

Approved by the
Department on
22.09.2021

Head of the Department
Prof. Dr. Ramona SUHAROSCHI, PhD

Approved by the Faculty
Council on
28.09.2021

Dean
Prof. Dr. Elena Mudura, PhD