

Academic Year/course: 2021/22

68757 - Study of the chemical basis of food flavor

Syllabus Information

Academic Year: 2021/22

Subject: 68757 - Study of the chemical basis of food flavor

Faculty / School: 105 - Facultad de Veterinaria

Degree: 631 -

ECTS: 3.0

Year: 1

Semester: Second semester

Subject Type: Optional

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process begins with participative group lectures, combined with practical sessions to provide skills to manage various tools and resources related to essential aspects of the subject and other individual activities (resolution of questionnaires and exercises, the study of practical cases derived from the theoretical classes, analysis, and synthesis of bibliographic material).

Laboratory practical sessions will be intercalated between the theory blocks so that students can apply in a practical way the knowledge acquired during theory classes.

4.2. Learning tasks

The course includes the following activities:

1. Five lectures in group (10 h)
2. One session of presentation and discussion of results (2 h)
3. Six practical sessions at the laboratory (18 h)
4. Preparation of papers and reports (15 h student only)
5. Questionnaires solving (30 h student only)

4.3. Syllabus

Lecture 1 (2.0 h): Aroma and flavor from a biological perspective. Basic issues of perception through the chemical senses (taste, smell, trigeminal-chemestesis): ecological function, evolution, structure, functioning, hedonic value, bioactivity, education, adaptation and culture.

Lecture 2 (2.0 h): The most relevant odorant systems in nature. The DMS and the sulfur cycle. Geosmin, MIB and eutrophication. Odorants formed by micro-organisms and fungi. Aromas of fermentation processes. Truffles and mushrooms. Large families of plant odorants: terpenes, nor-isoprenoids, phenylpropanoids, derivatives of fatty acids. Strategies, structures and systems for storage and dispensing of aroma in the world of plants

Lecture 3 (2.0 h): Aroma as a chemical phenomenon. Properties of molecules and odor. Burning-reception of molecules

Lecture 4 (2.0 h): Introduction to the psychology of perception and the psychophysics of aroma. Perception concept. Analytical (bottom-up) and synthetic (top-down) strategies. Importance of context and expectations. Cross-modality. Psychophysics 1. Measurement of the intensity of smells and other perceptions. Psychophysical curves. Adaptation. Psychophysics of mixtures 1. Intensity of binary and higher mixtures. Psychophysics of mixtures 2. Intensities of mixtures of odorants in the threshold zone. Measurement of the quality of the smell. Classic and unconventional analytical techniques. Non-verbal techniques for vocabulary generation. Other properties of the quality (hedonic character, familiarity and salience). Aroma of binary mixtures. Identification of odorants in mixtures. Creation of new smells.

Lecture 5 (2.0 h): Aroma analysis. Tools and procedures. Location, ranking, identification, quantification of odorants. Techniques for identifying sensoactive molecules. Sensoboloma concept. Philosophies of sensory directed screening. Odorants ranking by gas chromatography-olfactometry (GCO): Obtaining a representative extract. Experimental systems for representative purge and trap. Strategies for obtaining and treating the olfactory signal. Applications

Practical session 1 (3.0 h at chemical-sensory laboratory): Taste, touch (chemoesthesis) and smell. Smell x taste interaction. The hedonic value of some aromas

Practical session 2 (3.0 h at chemical-sensory laboratory): Properties of molecules with importance in their volatility, solubility and possible interactions with receptors. Chemical databases to obtain volatility and solubility data. Aromatic compounds databases

Practical session 3 (3.0 h at chemical-sensory laboratory): Individual and group threshold values. Interpersonal variability.

Practical session 4 (3.0 h at chemical-sensory laboratory): Construction of psychophysical curves. Odor intensity measurements. Charismatic odorants. Most relevant aromas of micro-organisms, plants and flowers. Perfume components.

Practical session 5 (3.0 h at chemical-sensory laboratory): Ranking and identification of the key odorants of a food product. A simplified food sample will be provided containing odorant molecules of different volatility and olfaction power. Students will apply various extract isolation and preparation strategies (purge and trap; direct solid phase extraction). The best extracts will be analyzed by semi-quantitative GC-O in two columns of different polarity and by GC-MS to obtain the corresponding mass spectra. With this information and the help of the databases, the different odorants will be identified.

Practical session 6 (3.0 h at chemical-sensory laboratory): Quantification of odorants: retention indices, mass spectra, databases

Seminar of presentation and discussion of results (2.0 h): Study of complex aromatic systems. Fractionation of extracts. Isolation, concentration and prefractionation techniques.

4.4. Course planning and calendar

Further information concerning the timetable and lectures and work presentations concerning to dates and important events related to the subject are in details described in the Faculty of Veterinary Science website: (<http://veterinaria.unizar.es/>). This website is updated at the beginning of the academic course.

Course will be start with lectures while practical sessions will be introduced after the corresponding theoretical contents.

4.5. Bibliography and recommended resources

Recommended bibliography at: <https://biblioteca.unizar.es/> Additional resources related to databases, software, and other material will be delivered to students as they need them.