

**Información del Plan Docente**

<b>Academic Year</b>	2017/18
<b>Faculty / School</b>	105 - Facultad de Veterinaria
<b>Degree</b>	566 - Master's in Food Quality, Safety and Technology
<b>ECTS</b>	3.0
<b>Year</b>	1
<b>Semester</b>	Second semester
<b>Subject Type</b>	Optional
<b>Module</b>	---

**1.General information**

**1.1.Introduction**

**1.2.Recommendations to take this course**

**1.3.Context and importance of this course in the degree**

**1.4.Activities and key dates**

**2.Learning goals**

**2.1.Learning goals**

**2.2.Importance of learning goals**

**3.Aims of the course and competences**

**3.1.Aims of the course**

**3.2.Competences**

**4.Assessment (1st and 2nd call)**

**4.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

**5.Methodology, learning tasks, syllabus and resources**

**5.1.Methodological overview**

The course's theoretical part is organized into two main sections. The first section describes biosynthesis, chemical structure, distribution, properties, stability and analysis of the main characteristics of the natural food pigments (carotenoids, polyphenols, chlorophylls, myoglobin and hemoglobin). The second one begins stating the fundamentals of color vision as the basis for colorimetric techniques. Then, the necessary calculations are explained to set the different coordinates of the CIE spaces. The student is given the necessary materials for these calculations in the form of spreadsheet, which later will be submitted as part of the assessment.

As a complement, the student must search on the web colorimetry material that complements the material delivered in the different sessions.

In the practice sessions, the student is in contact with various instruments used in color measurement. With the obtained data, they perform the calculations of color coordinates of measured objects. In the sessions dedicated to the discussion of practical results, the students make a critical interpretation of them.

### 5.2. Learning tasks

The course includes the following learning tasks:

- Lectures.
- Practical cases in the laboratory and in the classroom.

### 5.3. Syllabus

The course will address the following topics:

#### Section I. Origin of color.

Lectures (10 hours with sessions of 1 or 2 hours)

1. 1. Introduction to color pigments.
2. 2. Carotenoids.
3. 3. Polyphenols.
4. 4. Chlorophyll.
5. 5. Meat pigments.

Practice sessions (5 hours distributed in 2 sessions of 2.5 hours)

- Separation of pigments from spinach leaves by column chromatography: carotenes, chlorophyll a, chlorophyll b and xanthophylls (violaxanthin and neoxanthin).
- Separation of pigments from spinach leaves by thin layer chromatography.

#### Section II. Color measurement.

Lectures (10 hours with sessions of 1 or 2 hours)

1. 1. Vision color.
2. 2. Basis of colorimetry. Illuminant and observer pattern.
3. 3. Colorimetric calculations.
4. 4. Colorimetry of food. Color measurement devices.
5. 5. Techniques of the color measurement of liquids and solids. Difficulties and solutions.

Practice sessions (5 hours)

- The student will be in contact and use a spectroradiometer and a spectrophotometer for measuring reflectance spectra (opaque objects) and transmittance (transparent objects) respectively, from which it will calculate the color of them, comparing their results with those showed by the devices. The results obtained are analyzed individually, assessing them.

#### **5.4.Course planning and calendar**

The calendar of the lectures and practice sessions is published throughout the month of September on the website of the Faculty of Veterinary <http://veterinaria.unizar.es/>

#### **5.5.Bibliography and recommended resources**

- Hutchings, John B.. Food color and appearance / John B. Hutchings. - 2nd ed. Gaithersburg, Md. : Aspen Publishers, 1999
- Natural food colorants /edited by G. A. F. Hendry and J. D. Houghton. - 2nd ed. London [etc.]: Blackie Academic and Professional,1999
- Food colorants : chemical and functional properties / edited by Carmen Socaciu Boca Raton : CRC Press, 2008
- Química de los alimentos / editado por Srinivansan Damodaran, Kirk L. Parkin, Owen R. Fennema ; [traducción a cargo de : Pascual López Buesa, Rosa Oria Almudí ... (et al.)]. - 3<sup>a</sup> ed. en español, traducción de la 4<sup>a</sup> ed. inglesa Zaragoza : Acribia, D.L. 2010