



## IDENTIFYING DATA

### Analysis and quality control in enology

Subject	Analysis and quality control in enology			
Code	001G041V01912			
Study programme	Grado en Ciencia y Tecnología de los Alimentos			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	Spanish French Galician English			
Department				
Coordinator	Falqué López, Elena			
Lecturers	Falqué López, Elena			
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Web				
General description	That the student know the importance of some components of the grapes, musts, wines and distilled, definitional of their qualities; as well as the methodology of analysis for their identification and determination.			

## Training and Learning Results

Code				
A3	Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to have a reflection-based considered opinion on important issues of social, scientific and ethical nature.			
B1	Students will acquire analysis, synthesis and information-management skills to contribute to planning and conducting research activities in the food field.			
B2	Students will acquire and put teamwork skills and abilities into practice, whether these have multidisciplinary character or not, in both national and international contexts, becoming familiar with a diversity of perspectives, schools of thought and practical procedures.			
B5	Students will be able to take the initiative and acquire entrepreneurship skills, with a special focus on improving the quality of life.			
C1	To know the physical, chemical and biological foundations of food and its technological processes.			
C2	To be familiar with the chemistry and biochemistry of food and of its associated technological processes.			
C6	To be familiar with the industrial processes linked with the processing and transformation of food.			
C8	To be familiar with the systems of food quality, along with all the aspects linked to food regulation and legislation.			
C13	Ability to analyze food.			
C14	Ability to control and optimize processes and products.			
C17	Ability to analyze and assess food risks.			
C19	Ability to assess, control and manage food quality.			
D1	Analysis, organization and planning skills.			
D4	Independent-learning and information-management skills.			
D5	Problem-resolution and decision-making skills.			
D6	Interpersonal communication skills.			
D8	Critical and self-critical thinking skills.			

## Expected results from this subject

Expected results from this subject	Training and Learning Results			
LO-1: To know the basis of the different methodologies of analysis of compounds of enological interest, and applied to the different matrices (grape, must, wine, distilled).	A3	B1 B2 B5	C1 C2 C13 C19	D1 D4 D5 D8

LO-2: To know, to be able to select and to know to apply the most suitable analytical techniques for the analysis of the substances of interest in the different matrices (grape, must, wine, distillate), to determine their characteristics and to be able to evaluate and control the oenological quality.	A3	B1 B2 B5	C1 C2 C6 C8 C13 C14 C17 C19	D1 D4 D5 D6 D8
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## Contents

Topic	
SUBJECT 1. INTRODUCTION.	Chemical analysis and quality control of musts, wines and distilled. Methods of analysis: usual, official, of reference, etc. according to diverse organisms: OIV, AOAC ...
SUBJECT 2. ACIDITY.	Compound acids of the grape, came and distilleds: importance for the preparation and conservation of a product of quality. Methods of analysis for the determination of the total and volatile acidity. Determination of the malic, lactic and tartaric acids. Determination of majority and minority acids in musts, wines and distilleds by means of chromatographic techniques.
SUBJECT 3. SUGARS and SOLUBLE SOLIDS.	Content in sugars and quality of the grape: repercussion in the preparation of wines and distilleds. Methods for the determination of the likely degree, density and extract. Volumetric methods for the determination of the reducing sugars. Determination of sugars by chromatographic techniques.
SUBJECT 4. ALCOHOLS.	Alcohols: origin and paper. Physical bases-chemical of the usual methods/officials for the determination of the alcoholic degree. Application of the chromatographic techniques to the determination of methanol, ethanol and higher alcohols in wines and distilleds. Legal and toxicological importance.
SUBJECT 5. PRESERVATIVES.	Methodology for the determination of the SO <sub>2</sub> free and combined. Other preservatives of enological interest and his determination. Sanitary and legal appearances.
SUBJECT 6. PHENOLIC COMPOUNDS.	Importance of the phenolic composition in the stability and in the sensory characteristics of the wines. Determination of the total content and of the diverse groups of phenolic compounds: classical methods and chromatographic methods. Evaluation of the colour of the wines.
SUBJECT 7. AROMATIC COMPOUNDS.	Type of substances that participate in the aroma of a wine. Responsible compounds of unpleasant smells. Gas-chromatographic methods for the determination of the some families of responsible compounds of the varietal, fermentative and bouquet aromas.
SUBJECT 8. NITROGENOUS SUBSTANCES.	Nitrogenous composition of the grape and his transcendence in the vinificación, conservation and stabilisation of the wines. Methodology for the determination of nitrogen, ammonium and protein. Determination of amino acids and biogenic amines by chromatographic methods.
SUBJECT 9. MINERAL SUBSTANCES.	Mineral substances: Classification, origin and function. Analytical methodology for the determination of anions and cations of enological importance. Determination of ashes and alcalinity.

## PRACTICES OF LABORATORY.

Acidity: 5.  
Sugars: 1.  
Alcohols: 2.  
Preservatives: 2.  
Phenolic compounds: 2  
Volatile compounds: 1

Determination of the total acidity.  
Determination of the volatile acidity by the methods of Mathieu and of Cazenave-Ferré.  
Determination of malic acid by CCF and by spectrophotometry.

Determination of reducing sugars by the method of Lüff.

Determination of the alcoholic degree: method of distillation and method of Barus.

Determination of SO<sub>2</sub> free and combined: Methods of Ripper and of Rankine.

Polyphenolic compounds index (PTI).  
Color parameters by spectrophotometry.

Arome analysis by GC or sensory.

### Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	42	70
Laboratory practical	14	0	14
Mentored work	0	45	45
Case studies	0	3	3
Studies excursion	0	5	5
Essay questions exam	0	3	3
Laboratory practice	0	10	10

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

### Methodologies

	Description
Lecturing	Exhibition, by part of the professor, or of the student, of the most important appearances of the contents of the subject, theoretical bases and/or guidelines of a work, exercise or project to develop by the student.
Laboratory practical	Activities, in groups of 1-2 people, in which it will ascertain the direct application of the theoretical knowledges developed in the master sessions and in the tutored works.
Mentored work	The student, of individual way or in group, will elaborate a document on an appearance or concrete subject of the subject, by what will suppose the research and collected of the information, reading and handle of bibliography, editorial, exhibition...
Case studies	The professor will supervise, by means of tutorials or through the Moovi platform, the autonomous work developed by the student on cases/analysis of situations with bibliographic support, with the purpose to know it, interpret it, resolve it, generate hypothesis, diagnose it and to go into the alternative procedures of solution, to see the application of the theoretical concepts in the reality.
Studies excursion	The teaching of the course will complement with the assistance to some conference on enological subjects and/or with the visit to some cellar or to the Station of Viticulture and Enology of Galicia (EVEGA) and/or to Vinis Terrae.

### Personalized assistance

Methodologies	Description
Laboratory practical	To the start of each session of laboratory, the professor will do an exhibition of the contents to develop by the students. Likewise, during the development of the practices of laboratory, the student has to elaborate a fascicle of laboratory where collect all the relative observations to the experiment realised, as well as the data and results obtained. The student will have of all the material employed in classes (so much theoretical, like scripts of the practices of laboratory, like works realised by his mates) in the Moovi platform.
Mentored work	In the tutored works, the final document, the presentation and the exposition of the same, on the subject, conference, visit, reading summary, research or developed memory will be valued. The student will have of all the material used in classes (so much theoretical, like scripts of the practices of laboratory, like works realised by his mates) in the Moovi platform.
Case studies	It will value the final document on the study of a case or the analysis of a situation, and in his case also the exhibition of the same.

### Assessment

Description		Qualification	Training and Learning Results			
Lecturing	It will realise an examination where will evaluate the knowledges obtained in the course (10%). Class attendance will account for up to 5%. In the event that the studies excursion or lecture cannot be taken, 5% of that grade will be added to the 10% of the exam, becoming 15%.  Assessment: LO-1 and LO-2.	15	A3	B1 B2 B5	C1 C2 C6 C8 C13 C14 C17 C19	D1 D4 D5 D6 D8
Laboratory practical	The practices of laboratory will suppose until 25% of the final note, that includes the forcing to assist to all the sessions, the realisation of all the practices and the preparation and delivery of the memory of practices (will suppose until 20%). Also will take into account the attitude and participation of the student in classes (will suppose until 5% remaining). This part will have to be surpassed independently of the other to be able to surpass the course and be in conditions to add the assessment of the other activities. Assessment: LO-1 and LO-2.	25	A3	B1 B2 B5	C8 C13 C19	D1 D5 D6 D8
Mentored work	The participation, attitude, as well as the work in himself (form to tackle the concepts to work, editorial, presentation...) of the document written will account for up to 25% of the final qualification. The presentation (PPoint) and its exposition in class will represent up to 5% and 20%, respectively, of the final qualification. Assessment: LO-1 and LO-2.	50	A3	B1 B2 B5	C1 C2 C6 C8 C14 C17 C19	D1 D4 D8
Case studies	It will value , until 5% of the final qualification, the quality of the material requested (delivery of the practical cases, problems or analysis of situations and exercises), as well as the attitude of the student in the preparation of the same. Assessment: LO-1 and LO-2.	5	A3	B1 B2 B5	C1 C2 C6 C8 C13 C14 C17 C19	D1 D4 D5 D8
Studies excursion	The participation, attitude, as well as the work in himself (form to tackle the concepts to work, editorial, presentation...Of the document written and his exhibition, to be the case) will suppose until 5% of the final note. Assessment: LO-1.	5	A3	B1 B2 B5	C1 C2 C6 C8 C13 C14 C17 C19	D1 D4 D5 D6 D8

### Other comments on the Evaluation

#### ANNOUNCEMENTS 1st and 2nd Opportunity

There are two evaluation modalities (Continuous and Global), being the Continuous Evaluation the preferred one. Students who wish the Global Evaluation (100% of the grade in the official exam) must communicate it to the teacher, by e-mail, within a period not exceeding one month from the beginning of the teaching of the subject.

- **Continuos Evaluation modality.**

It implies the attendance and realization (compulsory) of all the described methodologies: exam (15%), laboratory practices (25%), tutored work (50%), case studies (5%) and field trip/conference (5%).

The laboratory practices, tutored work, field trips/conference and case studies will be graded by the teacher in charge based on the attendance (compulsory), and the attitude and aptitude of the students during the development of the same. Each group must submit a report of each of the activities where the theoretical information (tutored work and case studies), summary (of the field trip or lecture), and the data obtained in the laboratory and calculations performed, as well as the discussion and justification of the final results.

The grade obtained in these tests or methodologies will be kept for the 2nd call. For successive calls of the subject, only the grade obtained in the laboratory practices will be taken into account.

- **Global Evaluation modality.**

The student who chooses this modality will have to compulsorily perform the laboratory practices and will take an assessment exam on the same on the official date and whose maximum valuation will be 25%. The remaining 75% will be evaluated on the basis of an exam (on the official date) on the theoretical and practical part, with a maximum duration of three hours, where the theory part represents 80% of the grade and the practical part represents the remaining 20%, having to obtain a minimum of 5 points out of 10, both in theory and in practice.

## END OF CAREER EXAMINATION

The student who chooses to take the final exam will be evaluated only with the exam (which will be worth 100% of the grade). In case of not attending the exam or not passing it, he/she will be evaluated in the same way as the rest of the students.

## OFFICIAL DATES OF EXAMINATION

End of Career: 27-September-2023 (16 h)

1st Edition: 3-June-2024 (10 h)

2nd Edition: 11-July-2024 (16 h)

In case of error in the transcription of the exam dates, the valid dates are those officially approved and published on the bulletin board and on the Center's website.

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### Sources of information

#### Basic Bibliography

Ribéreau-Gayon, P., Dubourdieu, D., Donèche, B. y Lonvaud, A., **tratado de Enología. Tomos 1 y 2**, Hemisferio Sur, 2003

Curvelo-García, A.S., **Química enológica : métodos analíticos**, Publindústria, 2015

Office International de la Vigne et du Vin (OIV), **Recueil des méthodes internationales d'analyse des vins et des moûts**, OIV, 2007

Zoecklein, B.W., Fugelsang, K.C., Gump, B.H. y Nury, F.S., **Análisis y Producción de Vino**, Acribia, 2000

Ough, C.S., y Amerine, M.A., **Methods for analysis of must and wines**, 2ª, John Wiley, 1988

Maarse, H., **Volatile compounds in foods and beverages**, Marcel Dekker, 1991

Flanzy, C., **Enología : fundamentos científicos y tecnológicos**, Mundi-Prensa, 2000

Buglas, A.J., **Handbook of alcoholic beverages : technical, analytical and nutritional aspects**, Wiley, 2011

Moreno, J. y Peinado, R., **Enological chemistry**, Elsevier, 2012

Guzmán Alfeo, M., **Manual de espectrofotometría en enología**, AMV Ediciones, 2010

#### Complementary Bibliography

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### Recommendations

#### Subjects that it is recommended to have taken before

Instrumental analysis/O01G041V01403

Sample preparation techniques/O01G041V01305

Wine science and technology/O01G041V01911

Sensory evaluation of food/O01G041V01914

Viticulture/O01G041V01913