

POLYTECHNIC OF RIJEKA
AGRICULTURAL DEPARTMENT

STUDY PROGRAMME
OF THE SPECIALIST PROFESSIONAL GRADUATE STUDY
WINEMAKING

License of 23 June 2014

2014

STUDY PROGRAMME AMENDMENTS FORM

General information	
<i>Study programme name</i>	Specialist Professional Study of Winemaking
<i>Study programme holder</i>	Polytechnic of Rijeka
<i>Study programme performer</i>	Agricultural Department Poreč
<i>Study programme type</i>	Professional
<i>Study programme level</i>	Graduate
<i>Academic/professional title acquired after graduation</i>	Winemaking specialist

1. Type of amendments	
<i>1.1. Type of proposed amendments</i>	Introduction of new courses, renaming and redefining courses, reallocation of ECTS credits.
<i>1.2. Percentage of ECTS credits modified by proposed amendments</i>	50%
<i>1.3 Percentage of ECTS credits changed during the previous amendment process compared to the original accredited study programme</i>	0%

2. Explanation of the amendments request	
<i>2.1 Reasons for and explanation of the study programme amendments</i>	<p>After seven years of implementation of the Specialist Professional Graduate Study Programme of Winemaking, and after the analysis of the programme, student surveys and self-evaluation, and for the purpose of better programme compatibility and student mobility with other higher education institutions in the country and abroad, we propose programme changes. The existing one-year programme has included mastering narrowly specialized knowledge from the fields of the applied disciplines of agricultural production, primarily viticulture and winemaking, and we can say that in this respect the existing programme has fulfilled its mission. However, considering wine production in the wider context and taking into account new circumstances related to this production (EU accession, new trends in wine production), we believe that the existing programme should be updated and supplemented with new current contents and programmes adapted to the needs of the profession today. We believe that this specialist study programme should provide students with a broader understanding of the factors that affect the achievement of high quality of grapes, because only by training experts to produce high-quality grapes in different agro-ecological conditions and instilling in them the care to constantly raise that quality, can we ensure the continued prosperity of this branch of agricultural production. Of course, knowing the technology of vinification with modern devices and equipment available today is crucial. In recent years, we have witnessed the</p>

expansion of new technological solutions, such as the cryomaceration of black grapes, new equipment and devices available, such as inverse osmosis devices, electro dialysis devices, etc., whose use and proper application require expertly trained staff. We believe that an additional year of study that would enable the expansion and supplementation of some existing programmes, as well as the introduction of some new courses from the field of viticulture: „*Grape quality management*” and „*Organic viticulture*“, production technology: “*Technology of production of marc spirit and other traditional products*”, additional training in the field of wine sensory evaluation: „*Sensory evaluation III*“, as well as additional hours of practical work, would substantially enrich the specialist professional study programme of Winemaking, and increase its quality and attractiveness.

We also estimate that, upon Croatia’s accession to the EU, some problems could occur during the exchange and mobility of students with other compatible higher education institutions. Since the adoption of the Rulebook on the international mobility of students, teaching and non-teaching staff of the Polytechnic of Rijeka, under the Erasmus programme, of 22 December 2011, only students from the professional study programme of the Agricultural Department have participated in the exchange, while the students of the specialist professional study programme have not participated in that exchange, which we believe it’s partly due to the one-year study programme duration.

In this regard, we propose this Specialist Professional Graduate Study Programme of Winemaking as follows:

1 Introduction of new compulsory and elective courses. The introduction of new courses stems from the need to expand the programme by two semesters, as well as the need to broaden the electiveness opportunities of the programme to improve and adapt it to today’s insights and needs.

New elective courses:

1. *Biometrics in viticulture and winemaking*
2. *Safety and quality assurance systems*
3. *Grape quality management*
4. *Wine sensory evaluation III*
5. *Organic viticulture*
6. *Technology of production of marc spirit and other traditional products*
7. *Specialist internship*

3 Courses renaming. The course renaming aims to more precisely define the subject matter of courses. So, the course “*Selected topics in viticulture*“ was renamed into „*Grapevine physiology and ecology*“, which is taught in the first semester. In this way, the programme of the original course was expanded and enriched, and adapted to today’s needs of the profession.

4 Change of schedule. Changes in the class schedule are based on the equalization of the workload with the contents of individual courses.

New courses:

1. *Biometrics in viticulture and winemaking (30 + 15)*
2. *Safety and quality assurance systems (30 + 15)*
3. *Grape quality management (30 + 30 + 15)*
4. *Wine sensory evaluation III (30 + 15)*
5. *Organic viticulture (30 + 15)*

6. *Technology of production of marc spirit and other traditional products (30 + 15 + 15)*
7. *Specialist internship I (30)*
8. *Specialist internship II (30)*

Schedule changes of the existing courses:

1. *Wine microbiology (30 + 30 + 15)*
2. *Specific technologies in winemaking (30 + 30 + 15)*
3. *Native grapevine and wine varieties of Croatia (30 + 15 + 15)*

Renamed courses:

1. *Course titled Selected topics in viticulture (30 + 30+15) was renamed into new course titled Grapevine physiology and ecology (30 + 30+15)*

Change of ECTS credits. Changes in ECTS credits are based on the equalization of student workload and the equivalent evaluation of their work and achievement, and on the correction of disproportions among the courses.

ECTS credits changes of the existing courses:

1. *Chemistry of grape must and wine – 5 ECTS*
2. *Wine microbiology – 7 ECTS*
3. *Specific technologies in winemaking – 7 ECTS*
4. *Instrumental analysis methods – 5 ECTS*
5. *Grape polyphenols – 5 ECTS*
6. *Economy planning strategy – 5 ECTS*
7. *Cellar design – 5 ECTS*
8. *Wine marketing – 5 ECTS*
9. *European winemaking and wines – 5 ECTS*

New courses:

1. *Biometrics in viticulture and winemaking – 5 ECTS*
2. *Safety and quality assurance systems – 5 ECTS*
3. *Grape quality management – 7 ECTS*
4. *Wine sensory evaluation III – 5 ECTS*
5. *Organic viticulture – 5 ECTS*
6. *Technology of production of marc spirit and other traditional products – 6 ECTS*
7. *Specialist internship I – 3 ECTS*
8. *Specialist internship II – 3 ECTS*

Renamed course *Grapevine physiology and ecology* – 7 ECTS credits.

2.2 Assessment of the purposefulness of the amendments¹

The specificities of the production of wine and other alcoholic beverages, and the needs of the market, require that those products have distinctive features and characteristics of the area in which

¹ For example, the assessment of the purposefulness of the needs of the public and private labour market, the increase of the study quality, and more.

they are produced. Tourism development has additionally shown an increased need for sustainability and development, in accordance with scientific and professional achievements, specific production and specific grape products. If vineyard cultivation is also viewed from the aspect of cultivation and development of a recognizable landscape, it leads to a wider range of needs for highly educated professional specialists of such a profile, which also defines the purpose of existence and development of institutions that will educate such experts.

In recent years, many winemaking names in Istria have gained prominence. What is especially wonderful is the fact that they include a growing number of young winemakers who, by combining a traditional and modern understanding of production and business management, are achieving impressive results in both domestic and foreign markets.

Whether continuing family tradition or starting own winemaking business, the application of the latest, modern knowledge and technologies is common to everyone. Without them, there would be no progress nor production of high-quality wine in today's style - fresh white wine of primary aromas and aged mature red wine of harmonious structures and fullness. For this reason, in 2005, the Specialist Professional Graduate Study Programme of Winemaking was created, which was positively evaluated by the committee, and on that basis the competent Ministry issued a license for conducting the study programme on 21 June 2005. The specialist study programme is a one-year study programme and students earn 60 ECTS credits upon completion. The aim of launching and implementing the Specialist Professional Graduate Study Programme of Winemaking was to provide students with broader theoretical and practical knowledge for the complete independent management of an agricultural winery. The program included mastering narrowly specialized knowledge from the field of applied disciplines of agricultural production, primarily viticulture and winemaking. In this respect, the existing programme has fulfilled its mission. However, upon Croatia's accession to the EU, some problems could occur during the exchange and mobility of students with other compatible higher education institutions.

As previously stated, since the adoption of the Rulebook on the international mobility of students, teaching and non-teaching staff of the Polytechnic of Rijeka, under the Erasmus programme, only students from the professional study programme of the Agricultural Department have participated (which may be partly due to the fact that the specialist study programme lasts only one year), specifically:

1. Alen Bertoša, Biotehniški center Naklo, 1 March 2011 - 16 June 2011
2. Valentina Bognolo, Facolta di Agraria, Torino, 1 March 2013 - 30 June 2012
3. Mihovil Periša, Facolta di Agraria, Torino, 1 March 2013 - 30 June 2012
4. Katarina Rizner, Facolta di Agraria, Torino, 1 March 2013 - 30 June 2013
5. Tea Ivančić, Facolta di Agraria, 1 March 2013 - 30 June 2013

With regard to bilateral agreements covering the Agricultural Department, they include the following institutions:

- 1 Università degli studi di Torino, Facolta di Agraria (Italy),
- 2 Biotehniški center Naklo, Kranj, (Slovenia) and
- 3 Katholieke Hogeschool Kempen, Geel (Belgium).

Please note that new contacts with similar educational institutions are constantly being established, such as with Università degli studi di Verona – “Laurea in Scienze e tecnologie viticole ed enologiche”, so other institutions can be expected to soon be available to students.

For this reason, we propose this extended study programme, which is in accordance with today's knowledge and needs of the market, enriched with some very current topics, such as courses *Organic viticulture, Safety and quality assurance systems, Grape quality management and others*, allowing students to expand their electives and tailor the program to today's insights and needs.

We believe that the proposed specialist professional graduate study programme, due to its dynamism, meets current needs, both in the broader social context and within the higher education system, which is, following the incentives of social reality, undergoing transformational processes. Through the theoretical part of the programme, students will expand their knowledge and gain new, broader, professional knowledge in particular narrowly specialized fields. In addition to the theoretical part, the students will, in the cellar of the Polytechnic, Institute of Agriculture and Tourism Poreč and technology bases, monitor and perform some specific technological procedures in wine production, which significantly affect the characteristics of wine and significantly contribute to the product quality. In laboratories, they will be introduced to new analytical capabilities and analysis methods.

With such a study concept, graduated winemaking specialist will have broader knowledge and greater competences than the graduates of the existing one-year study programme, such as:

- Correctly interpret the concept of quality and quality assurance in grape processing and the production of wine and other grape and wine products,
- Apply and use the principles of the HACCP system,
- Understand implementation preconditions and implement system setup procedures.

- Maintain soil fertility and microbiological activity.
- Analyse and explain changes occurring in the ecosystem of a vineyard

- Interpret sources of variability in grape quality,
- Grow grapes for targeted (different) types of wine and determine the technological ripeness of the grapes for the production of such wine,
- Sensory evaluate the quality and degree of ripeness of grapes and
- Describe new technologies in viticulture based on sensor use and GPS technology (precision viticulture)

- Use sensory techniques for practical purposes: new product development, type determination, quality control, etc.
- Descriptively interpret and evaluate the developmental profile of wine and
- Lead wine tasting and presentation: white, rose, red, special, sparkling and vintage wine.

- Properly conserve raw material for the production of brandy.
- Properly perform distillation - distillation units and columns.
- Perform marc spirit standardization (blending) procedures.
- Produce brandy with 'traditional' additions - honey, parts of plants and fruits - "ruda" brandy, "biska" brandy, brandy with fennel, honey brandy, etc.

- Specify the setting rules and types of cellar and field experiments.
- Plan an experiment from the field of winemaking in a cellar and/or a field experiment from the field of viticulture.
- Define research problems, hypotheses, treatments, research parameters, repetitions.
- Conduct measurements/capability evaluations, collect data and apply statistical analysis tests.
- Interpret the results.

Education is therefore directed towards the needs of the agro-industrial complex with a focus on

creating experts in the field of the production of wine, special wine and other grape and wine products, with all the professional and moral characteristics required for such a noble vocation.

We are basing the need for programme changes on the number of the students who have graduated from the undergraduate study programmes of Winemaking and Mediterranean Agriculture, which on average amount to about 40 students annually. Most of the graduates of the undergraduate professional study programme of the Agricultural Department come from viticulture and winemaking families, or mixed family farms or businesses where they are mostly employed after graduation.

In the past period, 165 students have graduated from the professional study of winemaking. A large portion of the graduated engineers have continued to work on their own family farms, independently or with their parents, and some of them are nowadays well-known and respected wine producers. Here are some of them: Antunović Domo, Cellar „Antunović“, Pelješac, Arman Oliver, Cellar „Franc Arman“, Vižinada, Damjanić Ivan, Cellar „Damijanić“, Fuškulin, Geržinić Marko, Cellar „Geržinić“, Vižinada, Kozlović Gianfranco – Kozlović Winery, Momjan, Tercolo Roberto, Cellar „Tercolo“, Nova Vas, Trapan Bruno - family farm Trapan Bruno, Šišan, and others.

In addition to them, some of the graduated engineers today work as acknowledged consultant oenologists, such as: Bosek Damir – stancija „Meneghetti“, Bale, Kliman Mihaela – cellar „Matošević“, Sv. Lovreč, Perić

Goran – „Vason“ group (Italy), Visintin Elvis – cellar „Capo“, Brtonigla, Krajcar Marjan - cellar „Roxanich“, Poreč Sabina Salamun „Agrolaguna“ Poreč and others.

The one-year specialist professional study programme has been completed by 14 specialists, most of which are today recognized experts who work in different companies: Batel Toni - consultant, Pula, Jedrejčić Nikolina - Institute of Agriculture and Tourism Poreč, Jurinjak Nina – Cellar „Prelac“, Momjan, Katarinčić Danijela – Cellar „Kozlović“, Palman Ingrid - Brtonigla Development Agency, Brtonigla, Rubeša Kristijan - Cellar „Roxanich“, Poreč, Vižintin Maja - Cellar „Kabola“, Momjan.

It is evident from this that a relatively small number of graduated bachelor's degree holders completed the specialist professional graduate study of winemaking. One of the reasons for the relatively low response of the bachelor's degree holders can be sought in the existing form of the study programme - one year, 60 ECTS credits. This is confirmed by the fact that the majority of graduated specialists have stated that if a two-year study programme was started, they would want to enrol in it to make up the difference and graduate from a two-year specialist study programme. Please also note that by surveying undergraduate professional study programme students, we have received a clear confirmation that a two-year specialist study with 120 ECTS credits is more acceptable to them.

Of course, the duration of study programme itself is not the most important argument and is not an end in itself; we based this change primarily on the need to harmonize and enrich the program with new courses, which are very contemporary and adapted to today's needs of the profession. We primarily think that this specialist study programme should provide students with a broader knowledge of the entire vineyard ecology, every aspect of its environment, from the mineral composition of the soil, climatic characteristics, to the application of agro-technical measures and methods of vineyard maintenance. Only by training experts in the production of quality grapes in different agro-ecological conditions can we ensure the raw material for the production of high-quality wine. Of course, knowledge of the vinification technology with the modern devices and equipment available today is crucial.

As already mentioned, extending the study programme for a year allows us to expand and supplement certain existing programmes, as well as to introduce some new courses we find very important. Another course dealing with sensory characteristics of wine has thus been added: “*Sensory evaluation III*”, the viticulture programme has been expanded with new course „*Grape quality management*” which focuses on technological interventions that lead to targeted wine production, which we consider today to be crucial for maintaining a high level of wine quality. The course „*Technology of production of marc spirit and other traditional products*” was added, which deals with all aspects of production of high-quality and typical grape, grape marc and wine brandy, primarily “Istrian marc spirit”, but also other traditional brandies, which are in a very unenviable position today, but we believe that they can survive and even impose and compete with foreign products, but only with the production of high quality brandies, using modern technological knowledge and equipment in production. The course titled „*Safety and quality assurance systems*” has also been added, which deals primarily with the HACCP system, which, after the accession to the EU, is an indispensable part of any production. The contents of some courses have been expanded through practical work, two courses titled „Specialist internship“ have been added, and other.

In this regard, we propose this two-year Specialist Professional Graduate Study Programme of Winemaking, which, in addition to professional and practical knowledge, provides students with an appropriate number of ECTS credits.

2.3 Comparability of the amended study programme with similar programmes of accredited higher education institutions in Croatia and the EU²

In Croatia, to our knowledge, there is no identical professional graduate study. The professional graduate study programme closest to this branch is held at the Križevci College of Agriculture, titled: „[Specialist professional graduate study “Sustainable and organic agriculture”](#)” lasting 4 semesters and 1200 hours of classes (lectures, exercises, seminars and practice), upon the completion of which the students earn 120 ECTS credits (<http://www.vguk.hr/?gid=108>). Similar to this programme, but as a university graduate study programme, „*Horticulture - Viticulture and Winemaking*” is held at the Faculty of Agriculture, University of Zagreb, lasting 4 semesters and about 1200 hours of classes (lectures, exercises, seminars and practice), upon the completion of which the students earn 120 ECTS credits.

http://www.agr.unizg.hr/cro/nastava/ms/ms0703_program.htm

Similar professional and university study programmes are carried out in the EU, so this programme is similar to the study programme carried out at the „Università degli Studi di Verona“ in cooperation with „Università degli Studi di Padova“, where a similar study programme is carried out as the specialist graduate study programme “Vine and Wine Science and Technologies” lasting 4 semesters and about 1200 hours of classes, upon the completion of which the students earn 120 ECTS credits.

(<http://www.univr.it/main?ent=offerta&fac=1&tcs=S&aa=2009%2F2010#SpecialisedDegreecoursei nvineandwineproductionandmarketing>)

² Indicate and explain the comparability of programmes, at least one of which must be from the EU, with the amended proposed programme, and list the programmes' websites.

2.4. Compliance with the institutional strategy for the development of study programmes³

The strategy of the Polytechnic of Rijeka defines the basic task of the Polytechnic in the training of professionals directed at their future vocation, with an emphasis on practice and the provision of expertise specific to a particular area of interest. This training is carried out by organizing and conducting professional and specialist professional graduate study programmes, but also by conducting specific programmes with the aim of enabling continuous training in particular fields. In order to fulfil this basic task, the Polytechnic carries out highly professional and scientific work in the field of technical, biotechnical and social sciences. Specific study programmes are designed to meet the market demand for experts in farms and other business entities, primarily in the County of Primorje and Gorski Kotar, the County of Istria and the County of Lika and Senj, but in other parts of the Republic of Croatia as well. For this purpose, the Polytechnic cooperates with national and international higher education and scientific institutions, and provides the possibility for internal and external students' and teachers' mobility, with an emphasis on the rational use of human and material resources. Continuous quality control and growth in all areas of activity, competences and competitiveness of educational and professional work are important tasks that underpin the future of the Institution.

According to the adopted Strategy of the Polytechnic of Rijeka for the period 2013 - 2020, the primary task of the Polytechnic of Rijeka is to educate experts focusing more on practice with the aim of independent application of professional and scientific methods specific to a particular field of education. This implies continuous review of study programmes, their innovation and adaptation to the needs and requirements of the business environment and the Bologna Process, as well as the development and introduction of new study programmes. Therefore, the Strategy of the Polytechnic for the period 2013 - 2020 defines strategic goals by fields, so in the field "Studies and students" under Strategic Goal 1, the following *Task 1.4* is defined: *Organize the two-year Specialist Professional Graduate Study Programme of Winemaking by the end of June 2014.*

2.5 Other important information - in the opinion of the proponents

The Professional Graduate Study Programme of Winemaking is fully adapted to the standards and principles of mobility that underpin the Bologna Process. The study programme structure and ECTS credit ratios allow for increased mobility to which the agreed ECTS credit allocation standards, and compulsory and elective content ratios apply. These modifications enhance the existing mobility of the Erasmus programme.

During these 15 years of work, the Polytechnic has had three external periodic evaluations, which we consider to be important components of building the quality and efficiency system of every higher education institution, including ours. *The first external evaluation* carried out by the Expert Committee resulted in the issuance of an *Accreditation* by the Ministry of Science and Technology on 31 March 2004, establishing that "*the study programmes of the Polytechnic of Rijeka are at the required level*". *The second external evaluation* was carried out in 2009, and stated, among other things, that "*the Polytechnic has an acceptable number and structure of competent teaching staff, with appropriate workloads and sizes of student groups. It has a satisfying publishing activity and a high level of scientific and professional activity of its academic staff.*" *The third external evaluation* was carried out in 2012, organized by the Agency for Science and Higher Education, and concluded that "*Based on the insight into the available documentation, observations during the visits and*

³ More precisely, compliance with the mission and strategic goals of the University of Rijeka and the higher education institution.

interviews with the main stakeholders of the quality assurance system of the University of Rijeka, we conclude that the quality assurance system is developed, and our institution was awarded a Certificate (26 June 2013). We consider this Certificate not only as an acknowledgment, but primarily as a confirmation of our professional and quality work, and a guarantee that we have the necessary infrastructure and personnel for quality performance of the study programmes, including the proposed Specialist Professional Graduate Study Programme of Winemaking.

3. The list of compulsory and/or elective courses with incorporated amendments

3.1. The list of compulsory and elective courses (and/or modules, if any) with the number of active class hours required for their performance and the number of ECTS credits (appendix: Table 1)

The complete description can be found in Table 1

3.2 Description of every course (appendix: Table 2)

The complete description can be found in Table 2

3.1 The list of compulsory and elective courses with the number of active class hours required for their performance and the number of ECTS credits

Table 1

LIST OF COURSES							
First year of study							
Semester: I							
COURSE	HOLDER	L	E	S	Pw	ECTS	STATUS ⁴
Grapevine physiology and ecology	Vesna Kovačević, Ph.D., senior lecturer	2	2	-	1	7	0
Chemistry of grape must and wine	Siniša Petrović, Ph.D., principal lecturer	2	1	-	-	5	0
Wine microbiology	Sandi Orlić, Ph.D., principal lecturer	2	2	-	1	7	0
Grape must and wine aromas	Sanja Radeka, Ph.D., senior lecturer	2	2	-	-	6	0
Biometrics in viticulture and winemaking	<u>Raspor Janković</u> <u>Sanja, Ph.D., lecturer</u>	2	1	-	-	5	0
	Total in the semester	10	8	-	2	30	

LIST OF COURSES							
First year of study							
Semester: II							
COURSE	HOLDER	L	E	S	Pw	ECTS	STATUS ⁴
Wine sensory evaluation II	Kristijan Damijanić, grad. eng., lecturer	2	1	-	-	6	0
Specific technologies in winemaking	Mario Staver, Ph.D., principal lecturer	2	2	-	1	7	0
Instrumental analysis methods	Siniša Petrović, Ph.D., principal lecturer	2	1	-	-	5	0
Safety and quality assurance systems	Prof. Ibrahim Mujić, Ph.D.	2	1	-	-	5	0
Grape quality management	Marijan Bubola, Ph.D., lecturer	2	2	-	1	7	0
		10	7	-	2	30	

L- Lectures, E – Exercises, S – Seminar, Pw – Practical work

⁴ **IMPORTANT:** If the course is compulsory, 0 is entered, and if the course is elective, 1 is entered

LIST OF COURSES							
Second year of study							
Semester: III							
COURSE	HOLDER	L	E	S	Pw	ECTS	STATUS ⁴
Grape and wine polyphenols	Prof. Drago Šubarić, Ph.D.	2	1	-	-	5	0
Wine sensory evaluation III	Ivana Alpeza, Ph.D., senior lecturer	2	1	-	-	5	0
Organic viticulture	Melita Zec Vojinović, Ph.D., lecturer	2	1	-	-	5	0
Native grapevine and wine varieties of Croatia	Mario Staver, Ph.D., principal lecturer	2	1	-	1	6	0
Technology of production of marc spirit and other traditional products	Prof. Ibrahim Mujić, Ph.D.	2	1	-	1	6	0
Specialist internship I	Mario Staver, Ph.D.	-	-	-	2	3	0
	Total in the semester	10	5	-	4	30	

LIST OF COURSES							
Second year of study							
Semester: IV							
COURSE	HOLDER	L	E	S	Pw	ECTS	STATUS ⁴
Specialist internship II	Mario Staver, Ph.D., principal lecturer	-	-	-	2	3	0
Specialist diploma thesis		-	-	-	-	12	0
Economy planning strategy	Sandra Rugani Kukuljan, lecturer	2	1	-	-	5	1
Cellar design	Sandra Rugani Kukuljan, lecturer	2	1	-	-	5	1
Wine marketing	Kristina Brščić, Ph.D., principal lecturer	2	1	-	-	5	1
European winemaking and wines	Mario Staver, Ph.D., principal lecturer	2	1	-	-	5	1
	Total in the semester	6	3	-	2	30	

L- Lectures, E – Exercises, S – Seminar, Pw – Practical work

⁴ **IMPORTANT:** If the course is compulsory, 0 is entered, and if the course is elective, 1 is entered

Table 2**3.2 Course description**

General information		
Course holder	Vesna Kovačević, Ph.D., senior lecturer	
Course title	Grapevine physiology and ecology	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	7
	Number of classes (L+E+S)	L- 2, E - 2, S - 0, Pw - 1

1. COURSE DESCRIPTION*1.1. Course goals*

Introducing students to the basic postulates of modern viticulture production with an emphasis on the physiology of grapevine and the ecological conditions that influence the growth and development of vines.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

It is expected that after passing the exam in the course Grapevine physiology and ecology, the students will be able to do the following:

- Describe the primary physiological processes in grapevine (photosynthesis, respiration, transpiration, translocation, and distribution of assimilates within vine).
- Interpret the importance and role of factors that influence physiological processes in grapevine, such as light, temperature, water availability, nutrient availability.
- Determine and successfully maintain the physiological efficiency of vineyards and the balance between vine vegetative growth and fertility.
- Describe soil characteristics that influence the growth and development of grapevine, such as geological origin, texture, structure, drainage and water availability, depth, flora and fauna, nutrient presence, pH, colour and organic matter proportion.
- Describe the importance of climatic factors affecting the growth and development of grapevine.
- Calculate climate indices used in viticulture.
- Describe topographic influences on the growth and development of grapevine such as sunlight exposure, exposure, inclination, wind exposure, frost protection, altitude, latitude, proximity to large bodies of water.
- Select a good grapevine cultivation location.

1.4. Course content

Primary physiological processes in grapevine: photosynthesis, respiration, transpiration, translocation, and distribution of assimilates within vine. Factors that influence physiological processes in grapevine: light, temperature, water availability, nutrient availability. Physiological efficiency of vineyards. Determination and maintenance of physiological

efficiency of vineyards. Balance between vegetative growth and vine fertility. Soil characteristics that influence the growth and development of grapevine: geological origin, texture, structure, drainage and water availability, depth, flora and fauna, nutrient presence, pH, colour and organic matter proportion. Climatic factors that affect the growth and development of grapevine: temperature, sunlight, water, humidity and wind. Climate indices in viticulture. Topographic influences on the growth and development of grapevine: sunlight exposure, exposure, inclination, wind exposure, frost protection, altitude, latitude, proximity to large bodies of water. Position as a set of natural factors that influence the growth and development of grapevine and the quality of grapes. The concept of *terroir*.

1.5. Manners of teaching

X Lectures <input type="checkbox"/> Seminars and workshops	<input type="checkbox"/> Independent tasks
X Exercises <input type="checkbox"/> Distance education	<input type="checkbox"/> Multimedia and network
X <input type="checkbox"/> Field classes	<input type="checkbox"/> Laboratory
	<input type="checkbox"/> Mentoring
	X <input type="checkbox"/> Practical work

1.6. Comments

1.7. Students' obligations

Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.

1.8. Monitoring⁵ students' work

Class attendance	1	Class activity	1	Seminar paper	1	Experimental work	
Written exam	3	Oral exam		Essay		Research	
Project		Continuous knowledge assessment		Report		Practical work	1
Portfolio	4		1		1		1

1.9. Assessment and evaluation of students' work during classes and at the final exam

The evaluation of students' work is done continuously during class activities: class attendance (6%), activity at lectures, exercises and practical classes (14%), results of written preliminary exams (2 x 25%) and of the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.

Lectures, exercises and practical work 80 hours (3 credits)

Studying and literature studying 115 hours (4 credits)

1.10. Compulsory literature (at the time of submission of the study programme proposal)

1. Keller, M. (2010). The science of grapevines. Anatomy and physiology. Academic Press, New York, USA.
2. Maletić E., Karoglan Kontić J., Pejić I. (2008). Vinova loza - Ampelografija, ekologija, oplemenjivanje. Školska knjiga, Zagreb.

⁵ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

3. Mirošević N., Karoglan Kontić J. (2008). Vinogradarstvo. Nakladni zavod Globus, Zagreb.		
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>		
Fregoni M. (2005). Viticoltura di qualità. Tecniche nuove, Italy. Jackson R.S. (2000). Wine science. Academic Press, New York, USA. Coombe B.G., Dry, P.R. (2008). Viticulture – Volume 2 Practices. Winetitles, Ashford, Australia. Wilson J.E. (1999). Terroir. University of California Press, USA.		
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>		
<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Mirošević N., Karoglan Kontić J. (2008). Vinogradarstvo. Nakladni zavod Globus, Zagreb.	10	20
Maletić E., Karoglan Kontić J., Pejić I. (2008). Vinova loza - Ampelografija, ekologija, oplemenjivanje. Školska knjiga, Zagreb.	10	20
Keller, M. (2010). The science of grapevines. Anatomy and physiology. Academic Press, New York, USA.	3	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments, remarks and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Siniša Petrović, Ph.D., principal lecturer	
Course title	Chemistry of grape must and wine	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	6
	Number of classes (L+E+S)	L- 2, E -2, S – 0 / I

1. COURSE DESCRIPTION

1.1. Course goals

Introducing students to the structure, properties and chemical and biochemical changes of the compounds found in grape must and wine, with particular emphasis on the chemical reactions that take place during wine production.
The exercises allow students to become acquainted with specific methods for determining physico-chemical parameters of wine.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Interpret the physico-chemical composition of grape must and wine and link it to the used production processes and wine quality
- Define and distinguish individual series, and individual chemical compounds in grape must and wine, their origin and influence on wine characteristics
- Compare and distinguish different samples of grape musts and wine (physico-chemical and sensory), and determine the influence of individual series and individual chemical compounds on the observed differences
- Describe changes in the chemical composition of grape must and wine that take place during important processes in production and maturation
- Use theoretical knowledge of chemical composition and chemical changes in grape must and wine, and implement them in practical winemaking
- Use specific methods of analysis in a wine laboratory, draw conclusions from the results and implement them in practical winemaking

1.4. Course content

Chemical composition of grape must: water, sugars, acids, nitrogen compounds, phenolic compounds, volatile compounds and aroma compounds, enzymes, vitamins, minerals.
Reaction mechanisms of the synthesis of the basic constituents of grape must. Transformation of grape must into wine - fermentations: alcoholic fermentation, low alcoholic fermentation, malolactic fermentation. Mechanisms of chemical reactions during fermentation. Chemical composition of wine: sugars, alcohols, acids, nitrogen compounds, phenolic compounds, volatile compounds and aroma compounds, minerals. pH of wine. Oxidation-reduction potential of wine. Colloids in grape must and wine. The role of sulphur dioxide (SO₂).

Determination of physico-chemical parameters in wine.							
1.5. Manners of teaching				X Lectures <input type="checkbox"/> Seminars and workshops X Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes		<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring classes <input type="checkbox"/> Other	
1.6. Comments							
1.7. Students' obligations							
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.							
1.8. Monitoring ⁶ students' work							
Class attendance	1	Class activity	1	Seminar paper		Experimental work	
Written exam	4	Oral exam		Essay		Research	
Project		Continuous knowledge assessment		Report		Practical work	
Portfolio	5		1				
1.9. Assessment and evaluation of students' work during classes and at the final exam							
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits)</p> <p>Studying and literature studying 105 hours (4 credits)</p>							
1.10. Compulsory literature (at the time of submission of the study programme proposal)							
<ol style="list-style-type: none"> 1. Fregoni, M., Fregoni, C., Ferrarini, R., Spagnolli, F. (2004) Chimica viticolo - enologica, Reda Edizioni, Torino. 2. Radovanović, V. (1986) Tehnologija vina, Građevinska knjiga, Belgrade. 3. Muštović, S. (1985) Vinarstvo s enohemijom i mikrobiologijom, Privredni pregled, Belgrade. 4. M. Zoričić, Podrumarstvo, Nakladni zavod Globus, Zagreb, 1996. 5. R. Licul, D. Premužić: Praktično vinogradarstvo i podrumarstvo, Nakladni zavod Znanje, Zagreb, 1977. 							
1.11. Supplementary literature (at the time of submission of the study programme proposal)							
1. Ribéreau-Gayon, P., Dubourdieu, D., Doneche, B., LonVau, A. (2000) Handbook of Enology Vol. 1 - The Microbiology of Wine and Vinifications, John Wiley & Sons Ltd., West							

⁶ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

Sussex , England.
 2. Ribéreau-Gayon, P., Glories, Y., Maujean, A., Dubourdieu, D. (2000) Handbook of Enology Vol. 2 - The Chemistry of Wine/Stabilization and Treatments, John Wiley & Sons Ltd., West Sussex, England.

1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Fregoni, M., Fregoni, C., Ferrarini, R., Spagnolli, F. (2004) Chimica viticolo - enologica, Reda Edizioni, Torino.	5	20
Radovanović, V. (1986) Tehnologija vina, Građevinska knjiga, Belgrade.	2	20
Muštović, S. (1985) Vinarstvo s enohemijom i mikrobiologijom, Privredni pregled, Belgrade.	5	20
M. Zoričić, Podrumarstvo, Nakladni zavod Globus, Zagreb, 1996.	5	20

1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences

The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.

General information		
Course holder	Sandi Orlić, Ph.D., principal lecturer	
Course title	Wine microbiology	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	7
	Number of classes (L+E+S)	L- 2, E -2, S – 0, Pw-1 /I

1. COURSE DESCRIPTION

1.1. Course goals

Introducing students to new knowledge and importance of microorganisms in winemaking. Fundamentals of wine microbiology application in wine production.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

Define basic concepts related to wine microbiology.
 Define the role of microorganisms in wine production (yeasts, lactic acid bacteria, acetic bacteria, other bacteria, moulds).
 Define alcoholic, lactic acid, acetic and low ethanol fermentation.
 Define microorganisms causing wine spoilage with particular emphasis on *Brettanomyces*.
 Define new directions in the selection of yeasts and bacteria.
 Conduct biological deacidification.
 Conduct wine refermentation.
 Suggest and select selected yeasts for each variety and type of wine.

1.4. Course content

The role and importance of microorganism in wine production; the history of research related to wine microbiology; description of the most important microorganism species that play a role in wine production. The importance and role of yeast during alcoholic fermentation - new findings; problematic fermentations and their initiation. Importance and role of lactic acid bacteria and yeast during malolactic and low ethanol fermentation. Description and role of microorganisms (yeasts, bacteria and actinomycetes) in causing wine spoilage. History of yeast selection in the world and in Croatia; technological and qualitative characteristics of yeasts in selection; lactic acid bacteria selection. Yeast and lactic acid bacteria application procedures in wineries. Production of vinegar on family farms and in the industry; GMO in wine production.

1.5. Manners of teaching

X Lectures

Seminars and workshops

X Exercises

Independent tasks

Multimedia

		<input type="checkbox"/> Distance education	and network			
		<input type="checkbox"/> Field classes	<input type="checkbox"/> Laboratory	<input type="checkbox"/> Mentoring		
			<input checked="" type="checkbox"/> Practical work			
<i>1.6. Comments</i>						
<i>1.7. Students' obligations</i>						
Attending and following lectures, exercises and practical work, 2 preliminary exams and 1 written exam.						
<i>1.8. Monitoring⁷ students' work</i>						
Class attendance	1	Class activity	0.5	Seminar paper	Experimental work	0.5
Written exam	4	Oral exam		Essay	Research	
Project		Continuous knowledge assessment		Report	Practical work	1
Portfolio	5		0.5			1.5
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>						
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures, exercises, practice 75 hours (3.0 credits) Studying and literature studying 100 hours (4.0 credits)						
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>						
1. Duraković, S., Redžepović, S. (2002) Uvod u opću mikrobiologiju, University of Zagreb textbook, Zagreb 2. Duraković, S. (1996) Primijenjena mikrobiologija, University of Zagreb textbook, Zagreb 3. Fleet, G.H. (1993) Wine Microbiology and Biotechnology, T&F STM 4. Fungelsang, K. (1997) Wine Microbiology, Kluwer Academic Publishers 5. Riberau-Gayon, P., D., Dubourdieu, B., Doneche, A., Lonvaud (2006): Handbook of enology-The microbiology of Wine and Vinification, Volume 1, John Wiley & Sons, Paris						
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>						
1. Duraković, S., Duraković, L. (2000) Specijalna mikrobiologija, University of Zagreb textbook, Zagreb 2. Winde, J.H. (2003) Functional Genetics of Industrial Yeasts, Springer Zimmermann, F.K., Entian K.-D. (1997) Yeast sugar metabolism, Technomic Publishing						
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>						

⁷ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Wine Microbiology (Fungelsang), Kluwer Academic Publishers 1997	5	20
Wine Microbiology and Biotechnology (Fleet) T&F STM 1993	5	20
Duraković, S., Redžepović, S. (2002) Uvod u opću mikrobiologiju, University of Zagreb textbook, Zagreb	5	20
Duraković, S. (1996) Primijenjena mikrobiologija, University of Zagreb textbook, Zagreb	5	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Sanja Radeka, Ph.D., senior lecturer	
Course title	Grape must and wine aromas	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	1	
Credits and manner of teaching	ECTS student workload coefficient	6
	Number of classes (L+E+S)	Weekly classes fund: 2+0+2+0/ I

1. COURSE DESCRIPTION

1.1. Course goals

Through this course, students will significantly expand the already acquired knowledge and gain new knowledge about the formation of certain types of aromas (primary, secondary, tertiary aromas) and technological processes that better preserve and enhance these aromas. Students will be introduced to the chemical and biochemical processes that lead to the synthesis of volatile aromatic compounds (alcoholic fermentation, malolactic fermentation, esterification, hydrolysis, oxidation ..), olfactory properties, and technological procedures that can increase the concentration of certain aromatic compounds, and enhance a certain aromatic profile according to the desired wine type or style.

Exercises allow students to get acquainted with the sensory properties of aromatic compounds through sensory analysis of prepared model solutions, and the influence of a particular volatile aromatic compound or group of compounds on the sensory properties of different types of wine.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

After passing the exam in this course, the students will be able to do the following:

- Define and describe the basic groups of volatile aromatic compounds of the constituents of primary (varietal), secondary (fermentation) and tertiary aromas of grape must and wine (chemical and biochemical processes of synthesis of aromatic compounds, olfactory properties, and various technological procedures that can increase the concentration of individual aromatic compounds,
- Differentiate and correctly interpret different “styles of wine” with respect to their sensory properties,
- Sensory evaluate wine and define different aromatic profiles of wine,
- Independently apply different technological procedures at different stages of vinification (pre-fermentative, fermentative and post-fermentative phase of wine production) such as grape raisining, criomaceration, ambient maceration, use of pectolytic enzymes, different yeast strains, malolactic bacteria, barrique barrels...) with the aim of obtaining the desired type of wine with respect to its physico-chemical and sensory properties

1.4. Course content

Compounds of the primary (varietal) aroma of grape must and wine: terpenes, monoterpenes, C₁₃ norisoprenoid derivatives, methoxypyrazines, volatile odour thiols;
 Secondary (fermentation) aroma compounds of wine: higher alcohols, volatile esters, fatty acids
 Tertiary aroma compounds of wine: aldehydes, ketones, lactones, volatile phenols;
 The origin, precursors and biosynthesis of chemical compounds of grape must and wine aroma components;
 Olfactory properties, olfactory thresholds, different aromatic profiles of wine (floral, fruit, grass, spice, etc.),
 Influence of various factors on the concentration of wine aroma components: grape raisining, maceration of crushed grapes, pectolytic enzymes, β - glucosidases, yeasts, alcoholic fermentation, malolactic fermentation, wine maturation and aging, etc.

1.5. Manners of teaching

X Lectures

Seminars and workshops

X Exercises

Distance education
 Field classes

Independent tasks

Multimedia and network

Laboratory

Mentoring

Other

1.6. Comments

1.7. Students' obligations

Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.

1.8. Monitoring⁸ students' work

Class attendance	1	Class activity	1	Seminar paper		Experimental work	
Written exam	2	Oral exam	2	Essay		Research	
Project		Continuous knowledge assessment		Report		Practical work	
Portfolio	3		3				

1.9. Assessment and evaluation of students' work during classes and at the final exam

The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.
 Lectures and exercises 45 hours (2 credits)
 Studying and literature studying 105 hours (4 credits)

⁸ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>		
1. Sanja Radeka: Internal unreviewed script Grape must and wine aromas 2. Ribéreau – Gayon P., Glories Y., Maujean A., Dubourdieu, D. 2000: Handbook of enology, Volume 2. The Chemistry of Wine. Stabilization and Treatments, John Wiley & Sons Ltd., West Sussex, England.		
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>		
1. Ubigli, M. 1998 I profilli del vino. Edagricile BO. 2. R.J. Clarke and J. Bakker 2004: Wine flavour chemistry. Blackwell Publishing Ltd. 9600 Garsington Road, Oxford OX4 2DQ, UK.		
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>		
<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Ribéreau – Gayon P., Glories Y., Maujean A., Dubourdieu, D. 2000: Handbook of enology, Volume 2. The Chemistry of Wine. Stabilization and Treatments, John Wiley & Sons Ltd., West Sussex, England.	5	20
Internal materials	10	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Sanja Raspor Janković, Ph.D., lecturer	
Course title	Biometrics in winemaking and viticulture	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	1	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	2+1+0+0/IV

2. COURSE DESCRIPTION		
<i>1.14. Course goals</i>		
<p>Students will gain knowledge of biometrics and experimentation in winemaking and viticulture, experiment planning, experiment setup, definition of treatments, selection of research parameters, samples and repetitions. Students will gain knowledge of the capabilities and methods of data analysis, tests and conditions for conducting ANOVA, and tests for multiple analysis of significant differences between treatments.</p>		
<i>1.15. Course enrolment prerequisites</i>		
None		
<i>1.16. Expected learning outcomes of the course</i>		
<ul style="list-style-type: none"> – Specify the setting rules and types of cellar and field experiments. – Plan an experiment from the field of winemaking in a cellar and/or a field experiment from the field of viticulture. – Define research problems, hypotheses, treatments, research parameters, repetitions. – Conduct measurements/capability evaluations, collect data and apply statistical analysis tests. – Interpret the results. 		
<i>1.17. Course content</i>		
<p>Experiment planning and execution, experiment plans and schemes (completely random layout, random block layout, Latin square, Latin rectangle). Multifactorial experiments (two-factorial and three-factorial) experiments with split plots (Split-plot, Split-block and Split-split-plot). Experiments repeated in time and space. Defining treatments, parameters, patterns and data types. Populations, frequency distributions. Metrics describing distribution. Probability distribution and some more important theoretical distributions. Estimation of population parameters on the basis of sample values. Null hypothesis and null hypothesis testing. Variability analysis (F-distribution, F-test), variance analysis (ANOVA). Regression and correlation.</p>		
<i>1.18. Manners of teaching</i>	X Lectures	X Independent tasks <input type="checkbox"/> Multimedia and

		<input type="checkbox"/> Seminars and workshops <input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes		network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other <hr/> <hr/>		
1.19. <i>Comments</i>		2 preliminary exams are conducted as part of classes, activity at classes and attendance at lectures and exercises is monitored				
1.20. <i>Students' obligations</i>						
Attendance at lectures and exercises, studying of literature, activity at classes, 2 preliminary exams, 1 written exam						
1.21. <i>Monitoring⁹ students' work</i>						
Class attendance	0.5	Class activity	0.5	Seminar paper	Experimental work	1
Written exam	1.5	Oral exam		Essay	Research	
Project		Continuous knowledge assessment	1.5	Report	Practical work	
Portfolio	2		2			1
1.22. <i>Assessment and evaluation of students' work during classes and at the final exam</i>						
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits) Studying and literature studying 90 hours (3 credits)</p>						
1.23. <i>Compulsory literature (at the time of submission of the study programme proposal)</i>						
Vasilj, Đ. (2000). Biometrika i eksperimentiranje u bilinogojstvu. University of Zagreb, Croatian Society of Agronomists, ISBN 953-6485-12-5						

⁹ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

<i>1.24. Supplementary literature (at the time of submission of the study programme proposal)</i>		
Internal materials		
<i>1.25. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>		
<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Vasilj, Đ. Biometrika i eksperimentiranje u bilinogojstvu. University of Zagreb	4	20
Internal materials	20	20
<i>1.26. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
Anonymous student surveys Teacher self-evaluation		

General information		
Course holder	Kristijan Damijanić, grad. eng., lecturer	
Course title	Wine sensory evaluation II	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	6
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / II

1. COURSE DESCRIPTION

1.1. Course goals

Through this course, students will gain new knowledge about the sensory properties of wine, organization and conducting wine ratings, and the proper manner of verifying and testing tasters. In this way, they will be trained to independently organize wine tastings and ratings.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Correctly use professional terminology to describe wine.
- Use and explain rating lists and wine rating techniques at international wine exhibitions.
- Apply comparison systems: ranking, pairwise comparison, two-three test, triple test, panel tasting.
- Use different wine grading methods
- Use and correctly interpret the results of instrumental evaluation of sensory properties.

1.4. Course content

Conditions and methods of conducting sensory testing, international standards, internal sensory testing, sensory evaluation as a parameter of quality confirmation.

Rating methods:

- „ranking“,
- „pairwise comparison“,
- “two-three test”,
- “triangle” and
- „panel tasting“.

Development of descriptive profiles of wine. Descriptive sensory evaluation.

Quality evaluation of commercial wine.

Validation of sensory testing through instrumental methods, emphasis on gas chromatography and mass spectrophotometry.

1.5. Manners of teaching

Lectures

Seminars and workshops

Independent tasks

				X Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes	Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other
<i>1.6 Comments</i>					
<i>1.7. Students' obligations</i>					
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.					
<i>1.8. Monitoring¹⁰ students' work</i>					
Class attendance	1	Class activity	1	Seminar paper	Experimental work
Written exam	2	Oral exam	2	Essay	Research
Project		Continuous knowledge assessment		Report	Practical work
Portfolio	3		3		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>					
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures and exercises 45 hours (2 credits) Studying and literature studying 90 hours (4 credits)					
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>					
1. Sokolić, I. 2002 Tek i slast vina, Rijeka 2. Meigaard, M., Vance civile, G., Carr, B.T.1999. Sensory Evaluation techniques. CRC Press, Boca raton, FA, USA. 3. <u>Ronald S. Jackson</u> , 2009. Wine testing. Food Science and Technology. Elsevier Academic Press.					
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>					
1. Ubligi, M., 1998. I profilli del vino. Introduzione all'analisi sensoriale. Edagricole, Bologna. Italy 2. Pagliarini, E. 2002 Valutazione Sensoriale, Hoepli Editore SpA, Milano. Italy					
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>					
<i>Title</i>				<i>Number of copies</i>	<i>Number of students</i>
Sokolić, I. 2002 Tek i slast vina, Rijeka				4	20
Meigaard, M., Vance civile, G., Carr, B.T. 1999 Sensory Evaluation techniques. CRC Press, Boca raton, FA, USA.				4	20
<u>Ronald S. Jackson</u> , 2009. Wine testing.				4	20

¹⁰ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

Food Science and Technology. Elsevier Academic Press.		
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Mario Staver, Ph.D., principal lecturer	
Course title	Specific technologies in winemaking	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	7
	Number of classes (L+E+S)	L- 2, E -2, S – 0, Pw - 1 / II

1. COURSE DESCRIPTION

1.1. Course goals

Through this course, students will expand their knowledge of some specific technologies that can significantly contribute to faster maturation of wine, harmony and increase of the overall quality of wine.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Use specific technologies in wine production
- Explain and correctly interpret the processes during the maturation of wine in wood (large and small wooden vessels), extraction of ingredients from wood, oxidation-reduction processes in wine.
- Explain and correctly interpret the processes during the aging of wine on sediment (sûr lie method), the process and characteristics of wine.
- Carry out the process of Microoxygenation, and explain the process, effects and characteristics of wine obtained by this technological process.
- Explain and correctly interpret Hyperoxidation and Hyperreduction technology, the procedure and characteristics of wine obtained by these technologies.
- Produce white wine with and without maceration of crushed white grapes, explain the influence of maceration length and temperature on the characteristics and quality of wine.
- Produce red wine with different black crushed grapes maceration techniques, such as: criomaceration, post-fermentative warming, carbon maceration, etc.
- Assess the limit of positive impact of wood on wine.
- Explain the role of oxygen, SO₂, etc. on the characteristics and quality of red wine.

1.4. Course content

Maturation of wine in wood (large and small and barrique barrels), extraction of ingredients from wood, oxidation-reduction processes in wine, polymerization of polyphenolic ingredients.

Microoxygenation, the process, effects and characteristics of wine.

Hyperoxidation, the process and characteristics of wine.

Hyperreduction, the process and characteristics of wine.

Aging of wine on sediment (sûr lie method), the process and characteristics of such wine.

White crushed grapes maceration: maceration length, maceration temperature, wine characteristics.

Black crushed grapes maceration: maceration length, maceration temperature (crio maceration, post-fermentative warming), wine characteristics.							
<i>1.5. Manners of teaching</i>				<input checked="" type="checkbox"/> Lectures <input type="checkbox"/> Seminars and workshops <input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input checked="" type="checkbox"/> Field classes		<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input checked="" type="checkbox"/> Practical work	
<i>1.6. Comments</i>							
<i>1.7. Students' obligations</i>							
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.							
<i>1.8. Monitoring¹¹ students' work</i>							
Class attendance	1	Class activity	1	Seminar paper		Experimental work	0.5
Written exam	3	Oral exam		Essay		Research	0.5
Project		Continuous knowledge assessment		Report		Practical work	1
Portfolio	4		1				2
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>							
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures, exercises and practice 75 hours (3.5 credits) Studying and literature studying 90 hours (3.5 credits)							
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>							
1. Haslam, E. (1998). Practical polyphenols: From structure to molecular recognition and physiological action, Cambridge University Press, New York. 2. V. Radovanović (1986). Tehnologija vina, IRO „Građevinska knjiga“, Belgrade Ribéreau – Gayon P., Glories Y., Maujean A., Dubourdieu, D. (2000). Handbook of enology, Volume 2. the Chemistry of Wine. Stabilization and Treatments. 3. Zoričić, M. (1996). Podrumarstvo II – extended edition, Globus, Zagreb. Internal materials							
<i>1.27. Supplementary literature (at the time of submission of the study programme proposal)</i>							

¹¹ **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

1. Jackson, R. S. (2000). Wine science: Principles, practice, perception. Academic Press: San Diego, California, USA.
2. Mirošević N. (2009). Atlas hrvatskog vinogradarstva i vinarstva, Golden marketing.
3. Ribéreau-Gayon J., Peynaud E., Ribéreau-Gayon P., Sudraud P., Amati A. (1980): Trattato di scienza e tecnica enologica, volumen III, La vinificazione, Le trasformazioni del vino, AEB Brescia (Italia).

a. Number of copies of compulsory literature in relation to the number of students currently attending course classes

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Ribéreau – Gayon P., Glories Y., Maujean A., Dubourdieu, D. 2000: Handbook of enology, Volume 2. the Chemistry of Wine. Stabilization and Treatments.	5	20
V. Radovanović (1986). Tehnologija vina, IRO „Građevinska knjiga“, Belgrade	2	20
Zoričić, M. (1996). Podrumarstvo II – extended edition, Globus, Zagreb.	4	20
Internal materials	10	20

b. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences

The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.

General information		
Course holder	Siniša Petrović, Ph.D., principal lecturer	
Course title	Instrumental analysis methods	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / II

1. COURSE DESCRIPTION

1.1. Course goals

Introduction to the basics of instrumental methods of analysis in a chemical laboratory, with particular reference to their application in the analysis of wine ingredients.
Introduction to recent advances in analytical chemistry applied in wine analysis.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Describe and define common basic principles of analytical chemistry and instrumental analysis.
- Describe and distinguish theoretical and practical principles of individual instrumental analysis techniques and methods (spectroscopy and spectrometry - R, UV/VIS, AAS, AES, mass spectrometry, NMR; chromatography - GC, HPLC, coupled systems) in grape must and wine analysis.
- Use the specific applicability of individual techniques and methods of instrumental analysis, i.e. link techniques and methods with different parameters and groups of compounds in grape must and wine.
- Describe the operating principle of the basic instrument configurations used for instrumental analysis.
- Use different techniques of sample preparation for instrumental analysis (different methods of extraction, digestion, distillation, etc.), with a focus on the preparation of grape must and wine samples.
- Describe and define the principles of instrumental methods validation and critical validation parameters, with emphasis on grape must and wine analysis methods.

1.4. Course content

Introduction into instrumental analysis methods. Instrument response: signal-to-noise ratio. The interaction of electromagnetic radiation and matter. Theoretical principles and instrumentation of spectroscopic methods of analysis: IR, UV-Vis, NMR and mass spectrometry. Application of spectroscopic methods in wine analysis. Theoretical principles and instrumentation of elemental analysis spectrometric methods: atomic absorption (AAS) and atomic emission (AES) spectrometry. Application of spectrometric methods in wine analysis. Theoretical principles and the division of chromatographic analysis methods. Gas chromatography: operation principle and the parts of a gas chromatographic system.

Application of gas chromatography for the analysis of volatile compounds in wine. High performance liquid chromatography: operation principle of the parts of a liquid chromatographic system. Application of high-performance liquid chromatography for the analysis of polyphenolic compounds in wine. Preparation of samples for chromatographic analysis. Qualitative and quantitative analysis. Method validation.

<i>1.5. Manners of teaching</i>		<input checked="" type="checkbox"/> Lectures <input type="checkbox"/> Seminars and workshops <input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes		<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other		
<i>1.6. Comments</i>						
<i>1.7. Students' obligations</i>						
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.						
<i>1.8. Monitoring¹² students' work</i>						
Class attendance	1	Class activity	1	Seminar paper	Experimental work	0.5
Written exam	2	Oral exam		Essay	Research	0.5
Project		Continuous knowledge assessment		Report	Practical work	
Portfolio	3		1			1
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>						
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits) Studying and literature studying 90 hours (3 credits)</p>						
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>						
<p>1. Skoog, D. A., West, D. M., Holler, F. J. 1999 <i>Osnove analitičke kemije</i>, Školska knjiga, Zagreb.</p> <p>2. Pine, S. H. 1994 <i>Organska kemija</i>, Školska knjiga, Zagreb.</p> <p>3. Douglas A. Skoog, Donald M. West, F. James Holler (1995.). <i>Osnove analitičke kemije</i>, Školska knjiga Zagreb, ISBN: 978-953-0-30919-7, translated into Croatian</p>						
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>						

¹² **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

1. Kellner, R. A., Mermet, J. M., Otto, M, Widmer, H. M. (1998) *Analytical Chemistry*, Verlag Chemie, Weinheim.
2. Heftman, E. (1992) *Chromatography, Part A: Fundamentals and Techniques*, Journal of Chromatography Library, Vol. 51A, Elsevier, Amsterdam.

1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Skoog, D. A., West, D. M., Holler, F. J. 1999 <i>Osnove analitičke kemije</i> , Školska knjiga, Zagreb.	5	20
Pine, S. H. 1994 <i>Organska kemija</i> , Školska knjiga, Zagreb.	5	20
Douglas A. Skoog, Donald M. West, F. James Holler (1995.). <i>Osnove analitičke kemije</i> , Školska knjiga Zagreb, ISBN: 978-953-0-30919-7, translated into Croatian	4	20

1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences

The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.

General information		
Course holder	Prof. Ibrahim Mujić, Ph.D.	
Course title	Safety and quality assurance systems	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	1	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / II

1. COURSE DESCRIPTION

1.1. Course goals

Students will acquire basic knowledge about the concept of quality and quality assurance in the production of wine and grape and wine products, learn the principles of the HACCP system, as well as the preconditions for implementation and establishment procedures

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Correctly interpret the concept of quality and quality assurance in grape processing and the production of wine and other grape and wine products,
- Apply and use the principles of the HACCP system,
- Understand implementation preconditions and
- Implement system setup procedures.

1.4. Course content

The concept of quality and development in the field of quality, with reference to wine production. Principles and standards of quality management/legislation. Food safety, legislative aspects. Risk analysis, traceability. Food safety management, standards. Food safety assurance: the principles and application of HACCP, GPP, GHP. Quality management in a laboratory. Accreditation systems. Basic storage conditions. Chemical composition, physical and chemical properties and changes in raw materials of plant origin with emphasis on factors that affect the quality of final food products and the importance of individual components in the technological quality assessment. Exploitation of less valuable raw materials, by-products and waste in the grape processing industry. New advances in packaging. New technologies. Process monitoring and product quality control. Handling of finished products.

1.5. Manners of teaching

<input checked="" type="checkbox"/> Lectures	<input type="checkbox"/> Independent tasks
<input type="checkbox"/> Seminars and workshops	<input type="checkbox"/> Multimedia and network
<input checked="" type="checkbox"/> Exercises	
<input type="checkbox"/> Distance	

		education		<input type="checkbox"/>	Laboratory
		Field classes		<input type="checkbox"/>	Mentoring
				<input type="checkbox"/>	Other
<i>1.6. Comments</i>					
<i>1.7. Students' obligations</i>					
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.					
<i>1.8. Monitoring¹³ students' work</i>					
Class attendance	1	Class activity	1	Seminar paper	Experimental work
Written exam	3	Oral exam		Essay	Research
Project		Continuous knowledge assessment		Report	Practical work
Portfolio	4		1		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>					
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures and exercises 45 hours (2 credits) Studying and literature studying 90 hours (3 credits)					
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>					
1. Vlatka Turčić. (2000). HACCP i higijena namirnica. Zagreb 2. Kemijske i fizikalne opasnosti u hrani. (2010). Osijek, Croatian Food Agency (group of authors). 3. Biološke opasnosti u hrani. (2009.), Osijek, Croatian Food Agency (group of authors).					
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>					
D.A. Shapton, N.F. Shapton: Principles and Practices for the Safe Processing of Foods, Woodhead Publishing, Barnes&Noble, 1998					
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>					
<i>Title</i>		<i>Number of copies</i>		<i>Number of students</i>	
Vlatka Turčić. (2000). HACCP i higijena namirnica. Zagreb		5		20	
Kemijske i fizikalne opasnosti u hrani. (2010). Osijek, Croatian Food Agency (group of authors).		5		20	
Biološke opasnosti u hrani. (2009.), Osijek, Croatian Food Agency (group of authors).		5		20	

¹³ **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences

The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.

General information		
Course holder	Marijan Bubola, Ph.D., lecturer	
Course title	Grape quality management	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	First	
Credits and manner of teaching	ECTS student workload coefficient	7
	Number of classes (L+E+S)	L- 2, E -1, S – 0, Pw - 1 / II

3. COURSE DESCRIPTION

1.28. Course goals

Introducing students to specific professional, technological and scientific achievements in modern viticulture, with an emphasis on achieving the targeted and high quality of grapes.

1.29. Course enrolment prerequisites

No prerequisites

1.30. Expected learning outcomes of the course

It is expected that after passing the exam in the course Grape quality management, the students will be able to do the following:

- Describe berry development and grape composition from fertilization to overripeness stage.
- Describe physiological processes during grape ripening.
- Determine technological ripeness.
- Interpret sources of variability in grape quality.
- Describe the phenolic ripening of grapes and the development of the aromatic profile of grapes during ripening.
- Grow grapes for targeted (different) types of wine.
- Describe how the ampelotechnical winter and summer pruning affect the physiology of vines, fertility and quality of grapes.
- Select the cultivation form of vines and the planting spacing according to the target type of wine.
- Interpret the relationship between yield and grape quality.
- Maintain the vineyard soil and fertilize the vineyard in order to achieve the targeted quality of grapes.
- Apply irrigation in viticulture.
- Interpret the importance of position in grapevine cultivation.
- Describe the importance of grape varieties and clones as factors for the quality of grapes and wine.
- Determine the technological ripeness of grapes for the production of different types of wine.
- Determine harvesting date based on grape ripeness indicators.
- Sensory evaluate the quality and degree of grape ripeness.
- Choose the harvesting technology according to the desired quality of grapes.
- Describe new technologies in viticulture based on sensor use and GPS technology

(precision viticulture).							
1.31. <i>Course content</i>							
Berry development from fertilization to the overripeness stage. Physiological processes during grape ripening. Grape composition and its quality. Sources of variability in grape quality. Phenolic ripening of grapes. Development of the aromatic profile of grapes during ripening. Grape cultivation for targeted (different) types of wine. The impact of ampelotechnical winter and summer pruning on the fertility and quality of grapes. Physiological aspects of pruning. Selection of the cultivation form of vines and the planting spacing according to the target type of wine. The relationship between yield and grape quality. The concept of an ideal vine in terms of achieving high-quality grapes. Yield potential of vines. Soil maintenance and fertilization in order to achieve the targeted quality of grapes. Application of irrigation in viticulture. Importance of position in grapevine cultivation. Grapevine varieties and clones as factors for the quality of grapes and wine. Technological ripeness of grapes for the production of different types of wine. Grapes ripeness indicators and the determination of the harvesting date. Sensory evaluation of grape quality and ripeness. Harvesting technology and grape quality. New technologies in viticulture: sensor use and GPS technology (precision viticulture).							
1.32. <i>Manners of teaching</i>						<input checked="" type="checkbox"/> Lectures <input type="checkbox"/> Seminars and workshops <input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes	<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input checked="" type="checkbox"/> Practical work
1.33. <i>Comments</i>							
1.34. <i>Students' obligations</i>							
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.							
1.35. <i>Monitoring¹⁴ students' work</i>							
Class attendance	1	Class activity	1	Seminar paper	1	Experimental work	
Written exam	3	Oral exam		Essay		Research	
Project		Continuous knowledge assessment		Report		Practical work	1
Portfolio	4		1		1		1

¹⁴ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

<i>1.36. Assessment and evaluation of students' work during classes and at the final exam</i>		
The evaluation of students' work is done continuously during class activities: class attendance (6%), activity at lectures, exercises and practical classes (14%), results of written preliminary exams (2 x 25%) and of the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures, exercises and practice 75 hours (3 credits) Studying and literature studying 115 hours (4 credits)		
<i>1.37. Compulsory literature (at the time of submission of the study programme proposal)</i>		
1. Keller, M. (2010). The science of grapevines. Anatomy and physiology. Academic Press, New York, USA. 2. Maletić E., Karoglan Kontić J., Pejić I. (2008). Vinova loza - Ampelografija, ekologija, oplemenjivanje. Školska knjiga, Zagreb. 3. Mirošević N., Karoglan Kontić J. (2008). Vinogradarstvo. Nakladni zavod Globus, Zagreb.		
<i>1.38. Supplementary literature (at the time of submission of the study programme proposal)</i>		
1. Fregoni M. (2005). Viticoltura di qualità. Tecniche nuove, Italy. 2. Jackson R.S. (2000). Wine science. Academic Press, New York, USA. 3. Galet P. (2000). General Viticulture. Oenoplurimédia, Chaintré, France. 4. Coombe B.G., Dry, P.R. (2008). Viticulture – Volume 2 Practices. Winetitles, Ashford, Australia.		
<i>1.39. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>		
<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
The science of grapevines - Anatomy and physiology	4	20
Maletić E., Karoglan Kontić J., Pejić I. (2008). Vinova loza - Ampelografija, ekologija, oplemenjivanje. Školska knjiga, Zagreb.	10	20
Mirošević N., Karoglan Kontić J. (2008). Vinogradarstvo. Nakladni zavod Globus, Zagreb.	10	20
<i>1.40. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments, remarks and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Prof. Drago Šubarić, Ph.D.	
Course title	Grape and wine polyphenols	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / III

1. COURSE DESCRIPTION

1.1. Course goals

Introduction to various polyphenolic compounds in grapes and wine, changes during grape ripening, extraction and influence of the vinification technique, chemical reactions during maturation and aging to realize the possibility of the technologist's influence on the organoleptic properties of wine.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

Define and describe grape and wine polyphenols.
 Define basic groups of polyphenols, describe their properties and their influence on product properties.
 Link the structure of polyphenols and their antioxidant effect.
 Define their impact on health.
 Describe the changes that occur on polyphenols during processing,
 Analyse the interdependence of the chemical composition of raw material and the undesirable changes of polyphenols, i.e., changes of organoleptic properties during processing.
 Interpret the meaning of polyphenols in terms of assuring product properties, i.e., their impact on health.
 Describe the polyphenols analysis procedures by classical and modern methods.

1.4. Course content

Polyphenolic composition of grapes and wine. Division of polyphenolic compounds. Biosynthesis of flavonoids and non-flavonoids. The influence of environmental factors on the quantitative and qualitative composition. Location and distribution of different polyphenols in grapes. Changes in anthocyanins and tannins during grape ripening. Influence of the vinification technique on the extraction of anthocyanins and tannins from grapes. The influence of temperature and weather. Oxidative degradation of anthocyanins. Chemical equilibrium of anthocyanins dependent on sulphur dioxide and pH. Reactions of tannins, proteins and polysaccharides. Condensation reactions of tannins and anthocyanins. Copigmentation of anthocyanins. Organoleptic properties of polyphenolic compounds in red wine. Chemical reactions during maturation and aging of wine: reactions of anthocyanins and their influence on colour, reactions of tannins and their influence on taste. Origin of colour in white wine. Enzymatic and non-enzymatic browning of white wine.

<i>1.5. Manners of teaching</i>		<input checked="" type="checkbox"/> Lectures <input type="checkbox"/> Seminars and workshops <input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes		<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other	
<i>1.6. Comments</i>					
<i>1.7. Students' obligations</i>					
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.					
<i>1.8. Monitoring¹⁵ students' work</i>					
Class attendance	1	Class activity	1	Seminar paper	Experimental work
Written exam	3	Oral exam		Essay	Research
Project		Continuous knowledge assessment		Report	Practical work
Portfolio	4		1		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>					
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits)</p> <p>Studying and literature studying 100 hours (3 credits)</p>					
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>					
<ol style="list-style-type: none"> Jackson R.S. (2000). Wine science. Academic Press, New York, USA Radovanović, V. (1986). Tehnologija vina, IRO „Građevinska knjiga“, Belgrade Vermerris, W, Nicholson, R. (2006) Phenolic Compound Biochemistry, Springer, The Netherlands 					
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>					
<ol style="list-style-type: none"> Coombe B.G., Dry, P.R. (2008). Viticulture – Volume 2 Practices. Winetitles, Ashford, Australia. Fregoni M. (2005). Viticoltura di qualità. Tecniche nuove, Italy Galet P. (2000). General Viticulture. Oenoplurimédia, Chaintré, France Keller, M. (2010). The science of grapevines. Anatomy and physiology. Academic Press, New York, USA Zoričić, M. (1996). Podrumarstvo II – extended edition, Globus, Zagreb. 					
<i>1.12. Number of copies of compulsory literature in relation to the number of</i>					

¹⁵ **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

<i>students currently attending course classes</i>		
<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Jackson R.S. (2000). Wine science. Academic Press, New York, USA	4	20
Galet P. (2000). General Viticulture. Oenoplurimédia, Chaintré, France.	4	20
Radovanović, V. (1986). Tehnologija vina, IRO „Građevinska knjiga“, Belgrade	2	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Ivana Alpeza, Ph.D., senior lecturer	
Course title	Wine sensory evaluation III	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / III

1. COURSE DESCRIPTION

1.1. Course goals

Through this course, students will gain new knowledge about the sensory properties of wine, guided wine tastings, and the proper manner of verifying and testing tasters. In this way, they will be trained for guided tastings as well as to lead expert commissions for sensory evaluation.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Use sensory techniques for practical purposes: new product development, type determination, quality control, etc.
- Descriptively interpret the developmental profile of wine and the evaluation of commercial wine.
- Lead a wine tasting: white, rose, red, special, sparkling and vintage wine.
- Properly present wine using professional terminology in describing and evaluating the wine.

1.4. Course content

Examples of using sensory methods in practical cases:

Internal tastings:

- new product development,
- type determination,
- quality control and
- wine condition.

Guided tastings:

- white wine,
- rose wine,
- red wine,
- special wine,
- sparkling wine and

- vintage wine.							
1.5. Manners of teaching				X Lectures <input type="checkbox"/> Seminars and workshops X Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes		<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other	
1.6. Comments							
1.7. Students' obligations							
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.							
1.8. Monitoring ¹⁶ students' work							
Class attendance	1	Class activity	1	Seminar paper		Experimental work	
Written exam	1	Oral exam	2	Essay		Research	
Project		Continuous knowledge assessment		Report		Practical work	
Portfolio	2		3				
1.9. Assessment and evaluation of students' work during classes and at the final exam							
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits)</p> <p>Studying and literature studying 100 hours (3 credits)</p>							
1.10. Compulsory literature (at the time of submission of the study programme proposal)							
<p>1. Sokolić, I.2002. Tek i slast vina, Rijeka</p> <p>2. Meigaard, M., Vance civile, G.,Carr, B.T.1999. Sensory Evaluation techniques. CRC Press, Boca raton, FA, USA</p> <p>3. <u>Ronald S. Jackson</u>, 2009. Wine testing. Food Science and Technology. Elsevier Academic Press.</p>							
1.11. Supplementary literature (at the time of submission of the study programme proposal)							
<p>1. Ubligi, M., 1998. I profilli del vino. Introduzione all'analisi sensoriale. Edagricole, Bologna. Italy</p> <p>2. Pagliarini, E. 2002 Valutazione Sensoriale, Hoepli Editore SpA, Milano. Italy</p>							
1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes							
Title				Number of copies		Number of students	

¹⁶ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

Sokolić, I. 2002 Tek i slast vina, Rijeka	4	20
Meigaard, M., Vance civile, G., Carr, B.T. 1999 Sensory Evaluation techniques. CRC Press, Boca raton, FA, USA.	4	20
Ronald S. Jackson, 2009. Wine testing. Food Science and Technology. Elsevier Academic Press.	4	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Melita Zec Vojinović, Ph.D., lecturer	
Course title	Organic viticulture	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / III

1. COURSE DESCRIPTION

1.1. Course goals

Students will be trained in vineyard planning and design according to the requirements of organic agricultural production. They will understand the challenges of soil maintenance and will be able to use soil improvers. They will be able to practically apply agrotechnical and ampelotechnical measures in vineyards. They will be able to implement biological and biotechnical pest control measures. They will be trained to create an organic vineyard management plan. They will be prepared to carry out the certification process.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Plan and design an organic grapevine plantation.
- Independently manage an organic vineyard.
- Maintain soil fertility and microbiological activity.
- Independently determine pest protection and prevention measures.
- Analyse and explain changes occurring in the ecosystem of a vineyard

1.4. Course content

Introduction and principles of organic grape production
National and EU legislation in organic viticulture

Soil maintenance (cultivation, fertilization and nutrition of grapevine)
Use of plant consociations, cover and intermediate crops in vineyards
Vineyard maintenance (selection of varieties, fittings and pruning)
Prevention and protection against grapevine diseases, pests and weeds
Transition to an organic production system
Vineyard management plan creation
Certification process for organic grapes production
Indicators of sustainability and biodiversity in a vineyard

1.5. Manners of teaching

X Lectures	<input type="checkbox"/>
X Seminars and workshops	Independent tasks
X Exercises	X Multimedia and
<input type="checkbox"/> Distance	

						education X Field classes	network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other
<i>1.6. Comments</i>							
<i>1.7. Students' obligations</i>							
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.							
<i>1.8. Monitoring¹⁷ students' work</i>							
Class attendance	0.5	Class activity	0.5	Seminar paper	0.5	Experimental work	
Written exam	1.5	Oral exam		Essay		Research	
Project		Continuous knowledge assessment	2	Report		Practical work	
Portfolio	2		2.5		0.5		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>							
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits) Studying and literature studying 95 hours (3 credits)</p>							
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>							
<ul style="list-style-type: none"> • Mirošević N., Karoglan Kontić J., 2008. Vinogradarstvo, Nakladni zavod Globus, Zagreb. • Trioli G.; Hofmann U., 2009. Code of Good Organic Viticulture and Wine-Making, http://www.orwine.org/intranet/libretti/-orw%20gb%20bassa_264_01_0_.pdf • Teaching materials and scientific articles 							
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>							
Rombough L. J., 2002. The Grape Grower: A Guide to Organic Viticulture							
<i>1.12. Number of copies of mandatory literature in relation to the number of students currently attending course classes</i>							
<i>Title</i>				<i>Number of copies</i>		<i>Number of students</i>	
Mirošević N., Karoglan Kontić J., 2008. Vinogradarstvo, Nakladni zavod Globus,				10		20	

¹⁷ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

Zagreb.		
Trioli G.; Hofmann U., 2009. Code of Good Organic Viticulture and Wine-Making,	2	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Mario Staver, Ph.D., principal lecturer	
Course title	Native grapevine and wine varieties of Croatia	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	6
	Number of classes (L+E+S)	L - 2, E - 1, S - 0, Pw - 1 / III

1. COURSE DESCRIPTION

1.1. Course goals

Through this course, students will become better acquainted with the specifics of certain subregions and wine-growing hills of Croatia, and their most significant native varieties and wine.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Define the wine-growing regions, sub-regions and wine-growing hills of Croatia.
- Correctly describe the most significant native varieties of Croatia.
- Expertly describe the native wines of Croatia with respect to the cultivation area.
- Adapt the vinification techniques to the native variety in order to preserve the variety specificity.
- Produce individual native wines

1.4. Course content

Viticulture regions and subregions of Croatia.
 The wine-growing hills of individual subregions.
 Vineyard surface areas of individual subregions and wine-growing hills.
 Pedoclimatic characteristics of the most important Croatian wine-growing hills.
 The most significant vineyard locations of individual wine-growing hills.
 The most important native varieties of particular subregions or wine-growing hills.
 The significance and importance of native varieties in present and future wine production.
 Wines made from native varieties.
 Technological specificities in the production of certain native wines.
 Sensory characteristics of certain native wines.

1.5. Manners of teaching

X Lectures	<input type="checkbox"/>	Independent tasks
<input type="checkbox"/> Seminars and workshops	<input type="checkbox"/>	Multimedia and network
X Exercises		
<input type="checkbox"/> Distance		

		education		<input type="checkbox"/> Laboratory
		<input type="checkbox"/> Field classes		<input type="checkbox"/> Mentoring
				<input checked="" type="checkbox"/> Practice
<i>1.6. Comments</i>				
<i>1.7. Students' obligations</i>				
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.				
<i>1.8. Monitoring¹⁸ students' work</i>				
Class attendance	1	Class activity	1	Seminar paper
Written exam	2	Oral exam		Essay
Project		Continuous knowledge assessment		Report
Portfolio	3		1	
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>				
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures, exercises and practical work 60 hours (2 credits) Studying and literature studying 95 hours (3 credits)				
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>				
1. Mirošević, N. 1993 Vinogradarstvo. Nakladni zavod Globus, Zagreb. 2. Mirošević, N., Turković, Z., 2003. Ampelografski atlas, <u>Golden marketing - Tehnička knjiga</u> , Zagreb 3. Mirošević, N., 2009. Atlas hrvatskog vinogradarstva I vinarstva, <u>Golden marketing - Tehnička knjiga</u> , Zagreb 4. Herjavec, S. 2002 Hrvatska vina i vinari. Agmar, Zagreb.				
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>				
1. Butković, D. 2004 Vinska lista, Zagreb. 2. Špiranec, S., 2012., <u>Vinski putevi: vodič kroz vinarije i vina hrvatske</u>				
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>				
<i>Title</i>		<i>Number of copies</i>		<i>Number of students</i>
Mirošević, N. 1993 Vinogradarstvo. Nakladni zavod Globus, Zagreb.		10		20
Mirošević, N., Turković, Z., 2003. Ampelografski atlas, <u>Golden marketing - Tehnička knjiga</u> , Zagreb		4		20
Mirošević, N., 2009. Atlas hrvatskog vinogradarstva I vinarstva, <u>Golden</u>		4		20

¹⁸ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

<u>marketing - Tehnička knjiga, Zagreb</u>		
Herjavec, S. 2002 Hrvatska vina i vinari. Agmar, Zagreb.	4	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Prof. Ibrahim Mujić, Ph.D.	
Course title	Technology of production of marc spirit and other traditional products	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	6
	Number of classes (L+E+S)	L- 2, E -1, S – 0, Pw - 1 / III

1. COURSE DESCRIPTION

1.1. Course goals

Through this course, students will gain additional knowledge about proper preservation of raw material for brandy production, quality distillation (temperature, distillate “heart” extraction), distillate processing, selection of plant parts, preparation, addition and extraction for the production of brandy with “traditional” additives.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Define the raw material for the production of traditional products.
- Properly conserve raw material for the production of brandy.
- Explain the chemistry and products of alcoholic fermentation.
- Implement and correctly interpret distillation - basic principles, chemical changes, distillation devices and columns.
- Perform marc spirit standardization (blending) procedures.
- Produce brandy with ‘traditional’ additions - honey, parts of plants and fruits - “ruda” brandy, “biska” brandy, brandy with fennel, honey brandy, etc.

1.4. Course content

Division of brandy according to the Ordinance.
 Raw material for the production of marc spirit.
 Technological processes of primary raw materials processing.
 Grape marc preservation.
 Alcoholic fermentation, chemistry and the products of alcoholic fermentation.
 Distillation - basic principles, chemical changes, distillation devices, columns.
 Marc spirit standardization (blending) procedures.
 Maturation and care of marc spirits, physico-chemical processes in maturation.
 Brandies with ‘traditional’ additions - honey, parts of plants and fruits - “ruda” brandy, “biska” brandy, brandy with fennel, honey brandy, etc.
 Legislation on brandies (strong alcoholic beverages).

1.5. Manners of teaching

Lectures

Seminars

Independent

				and workshops X Exercises <input type="checkbox"/> Distance education X <input type="checkbox"/> Field classes	tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring X Practical work	
<i>1.6. Comments</i>						
<i>1.7. Students' obligations</i>						
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.						
<i>1.8. Monitoring¹⁹ students' work</i>						
Class attendance	1	Class activity	1	Seminar paper	Experimental work	
Written exam	3	Oral exam		Essay	Research	
Project		Continuous knowledge assessment		Report	Practical work	1
Portfolio	4		1			1
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>						
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures, exercises and practice 90 hours (3 credits) Studying and literature studying 105 hours (3 credits)						
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>						
1. Marić, V.: Biotehnologija i sirovine, Stručna i poslovna knjiga d.o. o., Zagreb, 2000. 2. Lucić, R.: Proizvodnja jakih alkoholnih pića, Nolit, Beograd, 1987. 3. De Rosa T., Castagner R.: Technologie delle grappe e dei destilati d'uva, Edizioni Agricole, 1994.						
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>						
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>						
<i>Title</i>				<i>Number of copies</i>	<i>Number of students</i>	
Marić, V.: Biotehnologija i sirovine, Stručna i poslovna knjiga d.o. o., Zagreb, 2000.				3	20	
Lucić, R.: Proizvodnja jakih alkoholnih				4	20	

¹⁹ **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

pića, Nolit, Beograd, 1987.		
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<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
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The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		
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General information		
Course holder	Mario Staver, Ph.D., principal lecturer	
Course title	Specialist internship I	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	3
	Number of classes (L+E+S)	L- 0, E - 0, S – 0, Pw - 3 / III

2. COURSE DESCRIPTION

1.14. Course goals

In “*Specialist practical work I*”, students will be additionally professionally trained and specialized in performing specific technological procedures during the processing and finishing of wine in the students’ cellar, the cellar of the Institute of Agriculture and Tourism Poreč and the technological bases of the Agricultural Department.

1.15. Course enrolment prerequisites

No prerequisites

1.16. Expected learning outcomes of the course

Conduct different vinification methods depending on the variety, quality of grapes and the desired type of wine.

Use different technical and technological methods in practical situations (processing, fermentation - alcoholic and malolactic, wine maturation and wine finalization).

Use specific oenological practices and oenological agents to improve products.

1.17. Course content

In the students’ wine cellar, upon enrollment in the second year of study, students will conduct their own vinification (with the supervision and professional assistance of professors and assistants of the Agricultural Department), using specific technological procedures, such as: Cryo-maceration, vinification in N₂ atmosphere, flotation, biological deacidification, etc. in the students’ cellar or the cellar of the Institute of Agriculture and Tourism Poreč, and if necessary in one of the technological bases of the Agricultural Department.

1.18. Manners of teaching

- | | |
|---|---|
| <input type="checkbox"/> Lectures | <input type="checkbox"/> |
| <input type="checkbox"/> Seminars and workshops | <input type="checkbox"/> Independent tasks |
| <input type="checkbox"/> | <input type="checkbox"/> Multimedia and network |
| <input type="checkbox"/> Exercises | <input type="checkbox"/> Laboratory |
| <input type="checkbox"/> Distance | <input type="checkbox"/> Mentoring |

General information		
Course holder	Mario Staver, Ph.D., principal lecturer	
Course title	Specialist internship II	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	3
	Number of classes (L+E+S)	L- 0, E 0, S – 0, Pw - 3 / IV

3. COURSE DESCRIPTION

1.27. Course goals

In “*Specialist practical work IP*”, students will be additionally professionally trained and specialized in performing specific technological procedures during the processing and finishing of wine in the students’ cellar, the cellar of the Institute of Agriculture and Tourism Poreč and the technological bases of the Agricultural Department.

1.28. Course enrolment prerequisites

No prerequisites

1.29. Expected learning outcomes of the course

- Perform more complex chemical analyses of wine using adequate laboratory methods,
- Improve and stabilize wine with modern oenological equipment and tools,
- Recognize wine aromas in relation to specific defective aromas and flavours of wine, such as the smell of UTA, *Brettanomyces* and other.

1.30. Course content

Complete the vinification started in the previous semester.
Most of the practical work will be done on the teaching-technology bases of the study programme, in order to familiarize students with the specific equipment and devices that the Polytechnic and the Institute do not have.

1.31. Manners of teaching	<input type="checkbox"/> Lectures <input type="checkbox"/> Seminars and workshops <input type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes	<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input checked="" type="checkbox"/> Practical work
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1.32. Comments

1.33. Students’ obligations

Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.							
<i>1.34. Monitoring²¹ students' work</i>							
Class attendance		Class activity		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Continuous knowledge assessment		Report		Practical work	3
Portfolio							3
<i>1.35. Assessment and evaluation of students' work during classes and at the final exam</i>							
The evaluation of students' work is done continuously during class activities: Practical work 45 hours (3 credits)							
<i>1.36. Compulsory literature (at the time of submission of the study programme proposal)</i>							
<i>1.37. Supplementary literature (at the time of submission of the study programme proposal)</i>							
<i>1.38. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>							
<i>Title</i>				<i>Number of copies</i>		<i>Number of students</i>	
<i>1.39. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>							
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.							

²¹ **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

General information		
Course holder	Sandra Rugani Kukuljan, lecturer	
Course title	Economy planning strategy	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Elective	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / IV

1. COURSE DESCRIPTION

1.1. Course goals

Developing knowledge about individual contribution to the collective in a strategically planned economy.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Define the concept of strategy and strategic planning
- Describe the principles of defining a region: planned region and the administrative statistical criterion
- Analyse the system of a city's active services important for the economy at the level of local self-government: the primary standard of people, public services, utility needs, production-business, communication-informational, social-health, educational-cultural and administrative services.
- Define the factors influencing the choice of strategy based on the analysis of the general and social, business and internal environment
- Describe the product life cycle model through the concepts of pre-commercialization, infiltration, growth, maturation, and decline

1.4. Course content

Planning as a system basis
 State economy planning strategies as an umbrella starting point
 Region economy planning strategy
 City and municipality economy planning strategy
 Planning strategy of individual and collective economy based on the principle of traditional and spatial-natural values, all in accordance with sustainable development.
 Small space economy planning strategy as a contribution to global development.

1.5. Manners of teaching

X Lectures	<input type="checkbox"/>
<input type="checkbox"/> Seminars and workshops	Independent tasks
X Exercises	<input type="checkbox"/>
<input type="checkbox"/> Distance	Multimedia and network

		education		<input type="checkbox"/>	Laboratory
		<input type="checkbox"/> Field classes		<input type="checkbox"/>	Mentoring
				<input type="checkbox"/>	Other
<i>1.6. Comments</i>					
<i>1.7. Students' obligations</i>					
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.					
<i>1.8. Monitoring²² students' work</i>					
Class attendance	1	Class activity	1	Seminar paper	Experimental work
Written exam	3	Oral exam		Essay	Research
Project		Continuous knowledge assessment		Report	Practical work
Portfolio	4		1		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>					
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 50 hours (2 credits)</p> <p>Studying and literature studying 90 hours (3 credits)</p>					
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>					
<p>1. Žugaj, M., R. Brčić, Menadžment, FOI, 2003.</p> <p>2. Oplanić, M., A. Milotić, A. Poropat: Statistika ruralnog prostora, Proceedings - scientific research topics "Rural family farms in Istria" 1997/98, Institute of Agriculture and Tourism, Poreč, 1999</p> <p>3. Jurcan, V.: Strategija planiranja gospodarstva Istre, Pula</p>					
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>					
<p>1. Caratteristiche strutturali delle aziende agricole, ISTAT, Roma, 1991.</p> <p>2. Spatial plan of the Istria County</p> <p>3. Development Strategy of the Republic of Croatia</p>					
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>					
<i>Title</i>		<i>Number of copies</i>		<i>Number of students</i>	
Jurcan, V.: Strategija planiranja gospodarstva Istre, Pula		4		20	
Oplanić, M., A. Milotić, A. Poropat: Statistika ruralnog prostora, Proceedings - scientific research topics "Rural family farms in Istria" 1997/98, Institute of		4		20	

²² **IMPORTANT:** Next to each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

Agriculture and Tourism, Poreč, 1999		
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Sandra Rugani Kukuljan, lecturer	
Course title	Cellar design	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Elective	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / IV

1. COURSE DESCRIPTION

1.1. Course goals

Students will acquire basic knowledge in the field of wine cellars based on historical tradition in building construction, the use of construction materials in the context of Istrian construction in the natural landscape.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Define the basic terms related to the procedure for issuing construction permits and the procedure for registering real estate and rights over them (cadastre and land register).
- Apply the principles of environmental protection, energy efficiency, occupational safety, waste management in the wine production process.
- Establish own desired style of production as a prerequisite for choosing the equipment and method of winery construction or arrangement.
- Define the basic concepts of sustainable development architecture - waste management, wastewater recycling, energy efficiency of systems and buildings
- Describe the functional scheme and workspaces of wineries
- Describe and interpret the microclimatic conditions of the wine production space - the physics of “passive” buildings (temperature, humidity, ventilation, thermal insulation of the winery space)

1.4. Course content

Historical development of wine cellars from prehistory to the present.
 General culture, knowledge of wine cellars of our region.
 Wine cellars of the classical antiquity period in our region, production, storage and transportation.
 Exchange of knowledge on wine cellars in the Mediterranean in the classical antiquity period.
 Construction of facilities for wine production, storage and transport.
 Cellars of the 19th and 20th century.
 Traditional wine cellars and construction of facilities in Istria.
 Standards and regulations in the construction of wine cellars.
 Wine cellar architecture.

<i>1.5. Manners of teaching</i>				<input checked="" type="checkbox"/> Lectures <input type="checkbox"/> Seminars and workshops <input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Distance education <input type="checkbox"/> Field classes	<input type="checkbox"/> Independent tasks <input type="checkbox"/> Multimedia and network <input type="checkbox"/> Laboratory <input type="checkbox"/> Mentoring <input type="checkbox"/> Other
<i>1.6. Comments</i>					
<i>1.7. Students' obligations</i>					
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.					
<i>1.8. Monitoring²³ students' work</i>					
Class attendance	1	Class activity	1	Seminar paper	Experimental work
Written exam	3	Oral exam		Essay	Research
Project		Continuous knowledge assessment		Report	Practical work
Portfolio	4		1		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>					
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits) Studying and literature studying 95 hours (3 credits)</p>					
<i>1.10. Compulsory literature (at the time of submission of the study programme proposal)</i>					
Medanić, B. – Management u građevinarstvu, Faculty of Civil Engineering, Osijek, 1997 Bistričić, D. – Investicijski program u turističkom okruženju, Inart, Poreč, 2005					
<i>1.11. Supplementary literature (at the time of submission of the study programme proposal)</i>					
Agricoltura familiare in transizione, Istituto nazionale di economia agraria, Roma, 1995. Design laws and regulations					
<i>1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>					
<i>Title</i>			<i>Number of copies</i>		<i>Number of students</i>

²³ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

Medanić, B. – Management u građevinarstvu, Faculty of Civil Engineering, Osijek, 1997	4	20
Bistričić, D. – Investicijski program u turističkom okruženju, Inart, Poreč, 2005	5	20
<i>1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>		
The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.		

General information		
Course holder	Kristina Brščić, Ph.D., principal lecturer	
Course title	Wine marketing	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Elective	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / IV

1. COURSE DESCRIPTION

1.1. Course goals

Marketing plan creation.

Knowledge of marketing communication.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Properly interpret business concepts
- Define the marketing concept and determinants of the marketing environment
- Analyse and interpret market segmentation
- Interpret secondary data from the market
- Interpret a marketing plan
- Conduct and interpret simpler research tasks in the field of wine marketing

1.4. Course content

Marketing concept definition. The role and meaning of research in a business environment. Market research concept and definition. Market segments identification and target markets selection. Consumer behaviour and buying decisions. Marketing mix elements: Product. Price. Distribution. Promotion. SWOT analysis. Marketing planning process. Strategy development, the concept and types of marketing strategies, strategic marketing process. Creating communication and promotional mix strategies. Sales channels. Creating direct marketing, sales promotion and public relations programs. Case study from winemaking.

1.5. Manners of teaching

- | | |
|---|---|
| <input checked="" type="checkbox"/> Lectures | <input type="checkbox"/> Independent tasks |
| <input type="checkbox"/> Seminars and workshops | <input type="checkbox"/> Multimedia and network |
| <input checked="" type="checkbox"/> Exercises | <input type="checkbox"/> Laboratory |
| <input type="checkbox"/> Distance education | <input type="checkbox"/> Mentoring |
| <input type="checkbox"/> Field | |

		classes	<input type="checkbox"/> Other
1.6. Comments			
1.7. Students' obligations			
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.			
1.8. Monitoring ²⁴ students' work			
Class attendance	1	Class activity	1
		Seminar paper	
		Experimental work	
Written exam	3	Oral exam	
		Essay	
		Research	
Project		Continuous knowledge assessment	
		Report	
		Practical work	
Portfolio	4		1
1.9. Assessment and evaluation of students' work during classes and at the final exam			
<p>The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored.</p> <p>Lectures and exercises 45 hours (2 credits)</p> <p>Studying and literature studying 95 hours (3 credits)</p>			
1.10. Compulsory literature (at the time of submission of the study programme proposal)			
<p>1. Kotler P.: Upravljanje marketingom: analiza, planiranje, primjena i kontrola, IX edition, MATE, Zagreb, 2001.</p> <p>2. Hall C. M., Mitchell R.: Wine Marketing: A Practical Guide, Butterworth-Heinemann, 2002.</p> <p>3. Grbac Bruno (2005). Marketing, koncepcija- imperativ-izazov, Faculty of Economics Rijeka</p> <p>4. Grbac Bruno (2005). Osvajanje ciljnog tržišta, Faculty of Economics Rijeka</p> <p>5. Marcel Meler, Đuro Horvat. Marketing vina, in preparation for publication in 2014</p> <p>6. P. Kotler, V. Wong, J. Saunders, G. Armstrong (2006). Osnove marketinga, MATE</p>			
1.11. Supplementary literature (at the time of submission of the study programme proposal)			
McDonald M.: Marketing plans: how to prepare them, how to use them, Fifth edition, Butterworth Heinemann, 2002.			
1.12. Number of copies of compulsory literature in relation to the number of students currently attending course classes			
<i>Title</i>		<i>Number of copies</i>	<i>Number of students</i>
Kotler P.: Upravljanje marketingom: analiza, planiranje, primjena i kontrola, IX edition, MATE, Zagreb, 2001.		4	20

²⁴ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

1.13. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences

The students have the opportunity to submit comments and suggestions regarding the content of the course and the teaching methods via a questionnaire.

General information		
Course holder	Mario Staver, Ph.D., principal lecturer	
Course title	European winemaking and wines	
Study programme	Specialist Professional Graduate Study of Winemaking	
Course status	Compulsory	
Year	Second	
Credits and manner of teaching	ECTS student workload coefficient	5
	Number of classes (L+E+S)	L- 2, E -1, S – 0 / IV

1. COURSE DESCRIPTION

1.1. Course goals

Introduction to the most important wine-growing regions of Europe. Introduction to the main wine varieties and wine of these regions. Introduction to the manner of protection and labelling of wine. Introduction to the main characteristics of wine.

1.2. Course enrolment prerequisites

No prerequisites

1.3. Expected learning outcomes of the course

- Explain the structure of production, import - export and consumption of wine in EU countries.
- Describe the most important European wine-growing regions for wine production.
- Describe and explain quality control, protection of origin and labelling of wine of the most important EU winegrowing countries.
- Describe the specific technological processes of vinification in the production of the most famous wines of particular regions.
- Describe the most important wine of particular countries and regions.

1.4. Course content

Overview of grape and wine production of the most important European countries (France, Italy, Spain, etc.).
 Production structure, import - export, wine consumption.
 The most important wine-growing regions for wine production.
 Quality control, origin protection and labelling of wine.
 The most important wine of particular countries and regions.
 Specific technological processes of vinification in the production of the most famous wines of particular regions.
 Specific characteristics of the most famous wines of particular regions.

1.5. Manners of teaching

x Lectures	<input type="checkbox"/>	Independent tasks
<input type="checkbox"/> Seminars and workshops	<input type="checkbox"/>	Multimedia and network
x Exercises		
<input type="checkbox"/> Distance		

		education		<input type="checkbox"/>	Laboratory
		<input type="checkbox"/> Field classes		<input type="checkbox"/>	Mentoring
				<input type="checkbox"/>	Other
<i>1.6. Comments</i>					
<i>1.7. Students' obligations</i>					
Attending and following lectures and exercises, 2 preliminary exams and 1 written exam.					
<i>1.8. Monitoring²⁵ students' work</i>					
Class attendance	1	Class activity	1	Seminar paper	Experimental work
Written exam	3	Oral exam		Essay	Research
Project		Continuous knowledge assessment		Report	Practical work
Portfolio	4		1		
<i>1.9. Assessment and evaluation of students' work during classes and at the final exam</i>					
The evaluation of students' work is done continuously during class activities: attendance (6%), activity at lectures and exercises (14%), written preliminary exams (2 x 25%), the final written exam (30% of the grade) or a remedial exam (10% of grade) are monitored. Lectures and exercises 45 hours (2 credits) Studying and literature studying 95 hours (3 credits)					
<i>1.41. Compulsory literature (at the time of submission of the study programme proposal)</i>					
1. Robinson, J. (1999). The Oxford Companion to Wine. Oxford University Press; 2nd Illus edition 2. Walton, S. (2006). Enciklopedija svjetskih vina, Leo Commerce, Rijeka.					
<i>1.42. Supplementary literature (at the time of submission of the study programme proposal)</i>					
1. Sicheri, G. (2005). Vini del Mondo. De Agostini, Italy 2. Špiranec, S. (2009). Vodič kroz vina Hrvatske, Vinart d.o.o. , Zagreb. 3. Garmaz, Ž., Garmaz, M.S. (2013). Vinske priče, self-published, Osijek.					
<i>1.10. Number of copies of compulsory literature in relation to the number of students currently attending course classes</i>					
<i>Title</i>		<i>Number of copies</i>		<i>Number of students</i>	
Robinson, J. 1999 The Oxford Companion to Wine. Oxford University Press; 2nd Illus edition		2		20	
Špiranec, S. (2009). Vodič kroz vina Hrvatske, Vinart d.o.o. , Zagreb.		4		20	
<i>1.11. Quality monitoring methods that ensure the acquisition of output knowledge, skills and competences</i>					
The students have the opportunity to submit comments and suggestions regarding the content					

²⁵ **IMPORTANT:** Next to the each of the methods of monitoring students' work, the appropriate share in the ECTS credits of individual activities should be listed, so that the total number of ECTS credits corresponds to the credit value of the course. You can use the blank fields for additional activities.

of the course and the teaching methods via a questionnaire.