WEINCAMPUS NEUSTADT

MODULE HANDBOOK

Description of the modules in the

Master of Science in Viticulture and Enology

Weincampus Neustadt
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Study Plan A

	Module no.	Modules Courses	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Examination or Coursework	Weighting for overall grade
1st Semester	**110**	**Professional Integration and Transformation 1 *** (Practice module)**		**10**	**250**	**1**	AP / EP	SL	0/116
		Process Engineering	Compulsory elective 1 out of 4			1			
		Regulatory Affairs Management				1			
		Precision / Sustainable Viticulture				1			
		R&D in Grape and Wine Production				1			
	120	**Wine Culture and Leadership Skills**		**5**	**125**	**5**	P	SL	0/116
		Cultural Context of Wine - Germany, France and Beyond **	Compulsory			2			
		Leadership and Intercultural Competences	Compulsory			2			
		European Wine Law and Protection of Intellectual Property	Compulsory			1			
	130	**Data Analysis and Methodology**		**5**	**125**	**4**	A	PL	5/116
		Advanced Statistical Modeling	Compulsory			2			
		International Scientific Communication	Compulsory			1			
		Applied Wine Research - Journal Club	Compulsory			1			
	140	**Future Technologies in Enology**		**5**	**125**	**5**	CS	PL	5/116
		Innovations in Enology	Compulsory			2			
		Process Engineering and Automation Technology	Compulsory			2			
		Quality Management	Compulsory			1			
	150	**Customer-centric Product Development**		**5**	**125**	**5**	CS, CS / CS, WB	PL	5/116
		Consumer Research and Behavior	Compulsory			2			
		Sustainable Product Development	Compulsory			1			
		Special Methods of Sensory Case Studies	Compulsory			2			
	Total			**30**	**750**	**20**			

	Module no.	Modules Courses	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Examination or Coursework	Weighting for overall grade
2nd Semester	**210**	**Professional Integration and Transformation 2 *** (Practice module)**		**10**	**250**	**1**	AP / EP	SL	0/116
		Process Engineering	Compulsory elective 1 out of 4			1			
		Regulatory Affairs Management				1			
		Precision / Sustainable Viticulture				1			
		R&D in Grape and Wine Production				1			
	220	**Ecology, Substainability and Management in Viticulture**		**5**	**125**	**3**	CS / A / P	PL	5/116
		Ecology and Biodiversity in the wineyard	Compulsory			1			
		Agricultural Meteorology and Precision Viticulture	Compulsory			1			
		Viticultural Management and Technology	Compulsory			1			
	230	**Innovation in Biotechnology and Chemistry**		**5**	**125**	**4**	P	PL	5/116
		Chemistry and Biotechnology of Wine Making	Compulsory			2			
		Advanced Techniques in Instrumental Wine Analysis **	Compulsory elective 1 out of 2			2			
		Advanced Molecular Microbiological Analysis **				2			
	240	**Management and Entrepreneurship in Wine**		**5**	**125**	**3**	A / CS	PL	5/116
		Sustainable Entrepreneurship and Wine Economics	Compulsory			2			
		Wine Marketing	Compulsory			1			
	250	**Climate Change and Viticulture: Influences and Adaptation Strategies**		**5**	**125**	**3**	CS / A / P	PL	5/116
		Impacts of Climate Change on Viticulture	Compulsory			1			
		Adaptation Strategies to Climate Change	Compulsory			2			
	Total			**30**	**750**	**14**			

3rd Semester	Module no.	Modules Courses	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Examination or Coursework	Weighting for overall grade
	310	**Transformation 3 *** (Practice module) ******		**9**	**225**	**1**	AP / EP / P	SL	0/116
	320	**Project ChemWine**** (Study abroad)**		**9**	**225**	**15**	WB	PL	9/116
	330	**Project VitiSmart 1**** (Study abroad)**		**3**	**75**	**6**	WB	PL	3/116
	410	**Master Thesis**		**9**	**225**	**1**	RP	PL	18/116
		Thesis Proposal		9		1			
	Total			**30**	**750**	**23**			

4th Semester	Module no.	Modules Courses	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Examination or Coursework	Weighting for overall grade
	410	**Master Thesis**		**21**	**525**	**2**	T,D	PL	42/116
		Thesis		16		1			
		Thesis Defense		5		1			
	420	**Project GreeneVine**** (Study abroad)**		**6**	**150**	**11**	WB	PL	6/116
	430	**Project VitiSmart 2**** (Study abroad)**		**3**	**75**	**2**	WB	PL	3/116
	Total			**30**	**750**	**15**			

Total degree program	**120**	**3000**	**72**			**116/116**

CP = Credit points within the framework of the European Credit Transfer System (ECTS)
PL = Examination = graded examination that is included in the overall grade calculation
SL = Course Work =graded or ungraded examination; the grade is not included in the overall grade calculation.
SWS = Semester hours per week
* The slash "/" between the examination types means "or".
In exceptional cases, combinations of examination types are possible; these are indicated by a ","
** Compulsory attendance according to §6 paragraph 6
*** Company practice phase
**** subject to French examination regulations of the UHA (study abroad)

Exam types:
A = Assignments
AP = Practice-integrating Assignments
CS = Case Study
D = Defence
EP = Portfolio
P = Presentation
RP = Research Proposal
T = Thesis
WB = Scientific Report

Note: The contact time in France cannot be converted directly into SWS. These figures therefore serve as a guide

Study Plan B

	Module no.	Modules Courses	Compulsory/elective	CP	Workload in h	SWS	Exam type *	Duration of exam	Examination or Coursework	Weighting for overall grade
1st Semester	**120**	**Wine Culture and Leadership Skills**		**5**	**125**	**5**	P		SL	0/125
		Cultural Context of Wine - Germany, France and Beyond**	Compulsory			2				
		Leadership and Intercultural Competences	Compulsory			2				
		European Wine Law and Protection of Intellectual Property	Compulsory			1				
	130	**Data Analysis and Methodology**		**5**	**125**	**4**	A		PL	5/125
		Advanced Statistical Modeling	Compulsory			2				
		International Scientific Communication	Compulsory			1				
		Applied Wine Research - Journal Club	Compulsory			1				
	140	**Future Technologies in Enology**		**5**	**125**	**5**	CS		PL	5/125
		Innovations in Enology	Compulsory			2				
		Process Engineering and Automation Technology	Compulsory			2				
		Quality Management	Compulsory			1				
	150	**Customer-centric Product Development**		**5**	**125**	**5**	CS, CS / CS, WB		PL	5/125
		Consumer Research and Behavior	Compulsory			2				
		Sustainable Product Development	Compulsory			1				
		Special Methods of Sensory Case Studies	Compulsory			2				
	160	**Core Competences Biology and Ecology of the Vine (Practice module)**		**5**	**125**	**4**	P / K	120 min	SL	0/125
		Grapevine Physiology, Biochemistry and Genetics	Compulsory			2				
		Vine Ecology: Climate, Soil, Biotic and Abiotic Stress	Compulsory			2				
	170	**Core Competences Enology (Practice module)**		**5**	**125**	**4**	K	120 min	SL	0/125
		Sensory Analysis, Wine Chemistry and Analytics	Compulsory			2				
		Applied Enology	Compulsory			2				
	Total			**30**	**750**	**27**				

	Module no.	Modules Courses	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Duration of exam	Examination or Coursework	Weighting for overall grade
2nd Semester	**220**	**Ecology, Substainability and Management in Viticulture**		**5**	**125**	**3**	CS / A / P		PL	5/125
		Ecology and Biodiversity in the wineyard	Compulsory			1				
		Agricultural Meteorology and Precision Viticulture	Compulsory			1				
		Viticultural Management and Technology	Compulsory			1				
	230	**Innovation in Biotechnology and Chemistry**		**5**	**125**	**4**	P		PL	5/125
		Chemistry and Biotechnology of Wine Making	Compulsory			2				
		Advanced Techniques in Instrumental Wine Analysis**	Compulsory elective 1 out of 2			2				
		Advanced Molecular Microbiological Analysis**				2				
	240	**Management and Entrepreneurship in Wine**		**5**	**125**	**3**	A / CS		PL	5/125
		Sustainable Entrepreneurship and Wine Economics	Compulsory			2				
		Wine Marketing	Compulsory			1				
	250	**Climate change and Viticulture: Influences and Adaptation Strategies**		**5**	**125**	**3**	CS / A / P		PL	5/125
		Impacts of Climate Change on Viticulture	Compulsory			1				
		Adaptation Strategies to Climate Change	Compulsory			2				
	260	**Core Competences Viticulture (Practice module)**		**5**	**125**	**4**	K	120 min	SL	0/125
		Smart & Sustainable Viticulture and Meterology	Compulsory			2				
		Viticultural Practices	Compulsory			2				
	270	**Science in Practice: Management and Language Skills**		**5**	**125**	**4**	P		SL	0/125
		Experimental Design and Project Management	Compulsory			2				
		Wine Specific English	Compulsory			2				
	Total			**30**	**750**	**21**				

	Module no.	Modules Courses	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Duration of exam	Examination or Coursework	Weighting for overall grade
3rd Semester	**350**	**Lab Rotation 1 (Practice module)**		**15**	**375**	**1**	WB		PL	15/125
		Plant Breeding	Compulsory elective 1 out of 5			1				
		Mitigation Strategies for Climate Change				1				
		Health Related Topics				1				
		Analytical Methodologies				1				
		Consumer Research				1				
	360	**Lab Rotation 2 (Practice module)**		**15**	**375**	**1**	WB		PL	15/125
		Plant Breeding	Compulsory elective 1 out of 5			1				
		Mitigation Strategies for Climate Change				1				
		Health Related Topics				1				
		Analytical Methodologies				1				
		Consumer Research				1				
	Total			**30**	**750**	**2**				

	Module no.	Modules	Compulsory/Elective	CP	Workload in h	SWS	Exam type *	Duration of exam	Examination or Coursework	Weighting for overall grade
4th Semester	**410**	**Master Thesis**		**30**	**750**	**3**	RP, T, D		PL	60/125
		Thesis Proposal	Compulsory	9		1				
		Thesis	Compulsory	16		1				
		Thesis Defense	Compulsory	5		1				
	Total			**30**	**750**	**3**				

Total degree program	**120**	**3000**	**53**			**125/125**

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SWS = Semester hours per week
***** The slash "/" between the examination types means "or".
In exceptional cases, combinations of examination types are possible; these are indicated by a ","
****** Compulsory attendance according to §6 paragraph 6

Exam type:
A = Assignments
CS = Case Study
D = Defence

K = Written Exam
P = Presentation
RP = Research Proposal
T = Thesis
WB = Scientific Report

Detailed module and event descriptions

110 Professional Integration and Transformation 1

110 Professional Integration and Transformation 1						1. Sem.	10 CP
Institute		Weincampus Neustadt					
Usability of the module		MSc Viticulture and Enology: Plan A					
Module coordinator		Prof. Dr. Lena Keller					
Lecturers		All full-time lecturers					
Requirements		Practice contract with cooperation company					
Learning outcomes		The students • identify and explain key concepts and practices in the wine industry, including process engineering, regulatory affairs, precision viticulture, and R&D. • can describe the research process, from identifying relevant research questions to data collection, analysis, and interpretation, in the context of their company projects. • apply theoretical knowledge to solve practical challenges within the company's operations, developing solutions and making informed recommendations based on research findings. • analyze and evaluate the efficiency of different industry practices and innovations, considering economic, environmental, and operational factors relevant to their company. • demonstrate effective project management skills, including planning, executing, and completing a research project within a given timeframe and managing company resources efficiently. • present research findings clearly and professionally to both technical and non-technical audiences, using appropriate communication techniques and tools. • justify their decisions and project outcomes by critically reflecting on their work and its impact on the company's operations and broader industry trends.					
Module content		The module is part of a cooperative study program in the wine industry, designed to help students apply academic knowledge to real-world industry challenges. Working closely with their respective companies, students select a relevant focus question from areas such as process engineering, regulatory affairs, precision/sustainable viticulture, or R&D in grape and wine production. The projects emphasize practical problem-solving, requiring students to analyze current practices and explore potential innovations. In coordination with their cooperative company and supervising professors, they then address this question, either independently or within a team they lead. The module fosters research and analytical skills by encouraging students to frame relevant research questions, conduct independent investigations, and interpret data to develop solutions and recommendations. In addition, students are tasked with project management, overseeing their projects from planning to completion while managing time and resources effectively. A strong emphasis is placed on communication, as students must present their findings clearly to both technical and non-technical audiences. Furthermore, the module encourages professional integration, helping students build networks within the wine industry while justifying their project outcomes. This module provides an essential platform for students to gain practical experience and industry insights, preparing them for future professional roles in the wine sector.					
Teaching and learning methods		Practice phase, challenge-based learning					
Workload (hours)	Workload in total	250 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture						
	Supervision	10,5					
	Laboratory						

110 Professional Integration and Transformation 1					1. Sem.	10 CP
	Challenge-based Learning	220				
	Field trip					
	Total	230,5			19,5	250
Module Exam	Exam type	e-Portfolio or practice-integrating Assignments				
	Determination of the module grade	100 % Portfolio or 100% practice-integrating Assignments				
	Prerequisite for the award of credit points	Passing the final module examination				
	Weighting for overall grade	0 of 116 CP for Plan A				
Offer frequency		Annual, winter semester			Duration: 1 Semester	
Teaching Language		English				
Literature		• Jamie Goode, The Science of Wine: From Vine to Glass:, ISBN 978-0520379503, 2021 • Ronald S. Jackson, Wine Science - Principles and Applications, ISBN 978-0128161180, 2020 • Lory Mitchell Wingate, Project Management for Research and Development, ISBN 978-1466596290, 2014				

120 Wine Culture and Leadership Skills

120 Wine Culture and Leadership Skills	**1. Sem.**	**5 CP**
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Prof. Dr. Maren Scharfenberger-Schmeer	
Lecturers	Prof. Dr. Maren Scharfenberger-Schmeer, Dr. Caroline Mary, Dr. Denise Grauer, different leaders of companies	
Requirements	None	
Learning outcomes	**121: Cultural Context of Wine - Germany, France and Beyond** The students • derive the milestones for the wine industry from Franco-German history. • make a holistic comparison of the significance of wine in today's cultures. • categorize their attitude towards the diversity of other cultures. • interact with people from other cultures. **122: Leadership and Intercultural Competences** The students • discuss relevant complex socio-political, cultural and intercultural issues • solve complex questions and provide well-founded answers • develop knowledge of culturally specific characteristics of France/Germany • present complex content • develop an interactive and collaborative method • conduct reception, production and co-operative strategies • demonstrate effective leadership skills tailored to the wine industry. • analyze and apply diverse leadership styles and philosophies. • implement leadership strategies learned from experienced professionals in the wine industry. • adapt leadership approaches to suit different cultural environments and team dynamics. • reflect critically on their own leadership style and its impact on team performance. **123: European Wine Law and Protection of Intellectual Property** The students • solve problems concerning European wine law • conduct solutions for sustainability and ethics in viticulture • present importance of geographical indications and intellectual property	

<table>
<tr><th colspan="6">120 Wine Culture and Leadership Skills</th><th>1. Sem.</th><th>5 CP</th></tr>
<tr><td colspan="2">Module content</td><td colspan="6">121: Cultural Context of Wine - Germany, France and Beyond
• cultural, historical and social aspects of viticulture in Germany, France and other important wine-growing regions
• history of viticulture in Germany and France as well as the cultural significance of wine in these two countries
• Regional differences and specialties will be highlighted by comparing German and French wine-growing regions.
• field trip to convey regional viticultural cultivation methods and grape varieties, wine styles and their oenological realization and the wine law context and provide an insight into the culturally determined specifics.

122: Leadership and Intercultural Competences
• Lectures and interactive sessions with guest speakers sharing their leadership journeys, challenges and successes.
• Exploration of various leadership styles and their applicability in different contexts.
• Personal leadership philosophy development and self-assessment exercises.
• Networking to connect with industry professionals.

• Practicing the basic techniques of objectively/critically analyzing information from theory and applications
• Critical and intensive analysis of challenging texts
• Conveying a complex picture of France/Germany
• Conceptual representation and problematization
• Dimension cultures, cultural standards and critical interaction situations
• Recognizing the danger of stereotyping and overgeneralization
• Intercultural sensitization

123: European Wine Law and Protection of Intellectual Property
• basics of European wine law
• protection of geographical indications
• copyright and related rights in the wine industry
• sustainability in viticulture and ethics
• practical applications</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="6">Lecture / Seminar (60%), Field trip (40%)</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="6">125 hours</td></tr>
<tr><td></td><td colspan="3">Courses</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>21</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td>21</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>52,5</td><td>52,5</td><td></td><td>20</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="6">Presentation</td></tr>
<tr><td>Determination of the module grade</td><td colspan="6">100 % Presentation</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="6">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="6">0 of 116 CP for Plan A, 0 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="4">Annual, winter semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="6">English</td></tr>
</table>

120 Wine Culture and Leadership Skills	**1. Sem.**	**5 CP**
Literature	**122: Leadership and Intercultural Competences** • Baasner, Frank (Hrsg.) (2005): *Gérer la diversité culturelle : théorie et pratique de la communication interculturelle en contexte franco-allemand*. Frankfurt am Main u.a.: Lang. • Barmeyer, Christoph (2012): *Taschenlexikon Interkulturalität.* Göttingen: Vandenhoeck & Ruprecht. • Barmeyer, Christoph (Hrsg.) (2010): *Interkulturelle Kommunikation und Kulturwissenschaft: Grundbegriffe, Wissenschaftsdisziplinen, Kulturräume*. Passau: Stutz. • Bolten, Jürgen (2014): '*Kultur' kommt von colere: Ein Plädoyer für einen holistischen, nichtlinearen Kulturbegriff*. In: Jammal, Elias (Hrsg.): *Kultur und Interkulturalität*. Wiesbaden, S. 85-108. • Bolten, Jürgen (2014): *Fuzzy Sandberg - oder: (Wie) lassen sich Kulturen beschreiben?* In: AFS Intercultural Link, 5, 1 S. 4-8. • Erll, Astrid/Gymnich, Marion ([4]2017 [2007]): *Interkulturelle Kompetenzen – Erfolgreich kommunizieren zwischen den Kulturen*. Stuttgart: Klett Lerntraining • Heringer, Hans Jürgen ([5]2017 [2004]): *Interkulturelle Kommunikation: Grundlagen und Konzepte*. Stuttgart: UTB. • Lüsebrink, Hans-Jürgen ([4]2016 [2005]): *Interkulturelle Kommunikation: Interaktion, Fremdwahrnehmung, Kulturtransfer*. Stuttgart/Weimar: Metzler • Schumann, Adelheid (2012): „Critical Incidents als Forschungsinstrument und als Trainingsgrundlage“. In: dies. (Hrsg.): *Interkulturelle Kommunikation in der Hochschule. Zur Integration internationaler Studierender und Förderung interkultureller Kompetenz*. Bielefeld: transcript, S. 55-80.	

130 Data Analysis and Methodology

130 Data Analysis and Methodology	**1. Sem.**	**5 CP**
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Prof. Dr. Lena Keller	
Lecturers	Prof. Dr. Lena Keller	
Requirements	None	
Learning outcomes	**131: Advanced Statistical Modeling**: The students • translate scientific questions into statistical hypotheses. • select suitable statistical models for a given problem, taking into account the available data. • analyze data using statistical programming software. • develop a critical perspective on the application of statistical methods to answer scientific questions. • compare statistical evaluation models and apply them to wine industry or enological issues. • develop proficiency in parameter estimation and constructing confidence intervals. • perform hypothesis testing and conduct regression analysis. • apply multivariate statistical methods to complex data sets. **132: International Scientific Communication**: The students • conduct thorough literature reviews. • write publishable scientific articles. • create effective scientific posters and presentations. • communicate professionally in front of a scientific audience. **133: Applied Wine Research - Journal Club**: The students • interpret and critically analyze scientific literature. • reflect on current research topics in guest lectures. • evaluate contemporary issues and advancements in wine research.	
Module content	This module equips students with essential skills in data analysis, scientific communication, and contemporary wine research, preparing them for advanced roles in the viticulture and enology industry. **131: Advanced Statistical Modeling**: This course covers the following statistical tools: • Parameter estimation and confidence intervals • Hypothesis testing • Regression analysis • Multivariate statistics • Students will learn the basics of the Python programming language using Jupyter Notebook and apply these skills to the statistical analysis of datasets. **132: International Scientific Communication**: • Literature review • The writing process • Structure of scientific publications • Poster and oral presentations • Fundamentals of science communication **133: Applied Wine Research - Journal Club**: This course focuses on interpreting scientific literature. Recent publications from different fields will be presented. This aims to familiarize students with current topics in wine research.	

<table>
<tr><th colspan="3">130 Data Analysis and Methodology</th><th colspan="3">1. Sem.</th><th>5 CP</th></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="5">Lecture 50 %, Seminar 25 %, Exercise 25 %</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="5">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="3">Courses</td><td></td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>21</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>42</td><td>63</td><td></td><td>20</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="5">Assignment</td></tr>
<tr><td>Determination of the module grade</td><td colspan="5">50 % 131, 25 % 132, 25 % 133</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="5">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="5">5 of 116 CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="3">Annual, winter semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="5">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="5">• Michael O'Mahony, Sensory Evaluation of Food – Statistical Methods and Procedures, ISBN 978-0-8247-7337-3, 1986
• An Introduction to Statistics with Python: With Applications in the Life Sciences, Thomas Haslwanter, ISBN 978-3-03097-370-4, 2022
• Wes McKinney, Datenanalyse mit Python, O'Reilly, ISBN 978-3-96009-211-7, 2023
• Jake VanderPlas, Data Science mit Python, mitp, ISBN 978-3-95845-695-2, 2018
• Angelika Hofmann, Scientific Writing and Communication: Papers, Proposals, and Presentations, ISBN 978-0-19027-854-0, 2016</td></tr>
</table>

140 Future Technologies in Enology

140 Future Technologies in Enology	1. Sem.	5 CP
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Prof. Dr. Dominik Durner	
Lecturers	Prof. Dr. Dominik Durner, Prof. Dr. Ulrich Fischer, Dr. Armin Schüttler	
Requirements	None	
Learning outcomes	**141: Innovations in enology** The students • differentiate innovative processes in the production of white, red and sparkling wines with regard to production goals, product quality, typicality and authenticity and their application • develop problem-solving skills in enological process engineering to counter production and market-related challenges • comparatively asses traditional and innovative winemaking technologies in a regional, national and global context • evaluate the use of digital methods for control, management and regulation in enology with regard to their functionality and benefits • interpret structural conditions and future challenges • assess structural challenges related to innovation processes in enology **142: Process engineering and automation technology** The students • recognize the technological methods, viticultural prerequisites, legal foundations and enological and microbiological requirements for producing special wine styles in the realm of sparkling and semi-sparkling wines, liqueur wines, non-alcoholic wines and wine-based beverages • describe the chemical and sensory characteristics of wines of the above-mentioned special wine styles • relate the wine characteristics to climatic and geological conditions • assess enological and technological processes for producing special wine styles in terms of quality • explain the influence of enological and technological processes as well as specific process parameters on the product quality, typicality and authenticity of special wine styles • present the market development and future market potential of special wine styles in an international context • transfer existing special wine stiles to other wine-growing regions and grape varieties **143: Quality management** The students • apply the definition of quality in the relevant sub-areas of production and the market • apply their knowledge of international and national (commercial) legal requirements to ensure marketability of products • name the structure of different normative standards (e.g. ISO, GMP, IFS) and their areas of application. • use the elements and instruments of quality management systems • identify risks in the production of wine and beverages and initiate measures to minimize them		

<table>
<tr><th colspan="6">140 Future Technologies in Enology</th><th>1. Sem.</th><th>5 CP</th></tr>
<tr><td colspan="2">Module content</td><td colspan="6">141: Innovations in enology
Lecture with day excursion for:
• detailed explanation and presentation of innovative processes in the preparation of white, red and sparkling wines
• discursive development of production goals, product quality, typicality and authenticity
• imparting of problem-solving skills in the field of enological process engineering on the basis of case studies
• comparison of traditional and innovative winemaking technologies in a regional, national and global context
• discussion of digital methods for monitoring, control and regulation in enology
142: Process engineering and automation technology
Lecture
• detailed explanation and presentation of enological procedures and their process parameters for producing special wine styles in the field of semi-sparkling and sparkling wines, liqueur wines, non-alcoholic wines and wine-based beverages
• discursive discussion of production and market challenges
• organization of tasting workshops on sparkling and semi-sparkling wines, liqueur wines, non-alcoholic wines and wine-based beverages
143: Quality management
Lecture and Case Study
• definition of (Food & Beverage) Quality – socio-cultural, economic, sustainability aspects
• introduction into international and national legislative and regulatory framework of the food and beverage supply chains and markets
• detailed presentation of normative standards and certification systems implicated in the food and beverage industry – e.g. ISO series, GMP, IFS
• practical elements and tools of quality management systems, e.g. QMH & SOP systems
• detailed introduction into the concept of HACCP
• specific quality assurance and management in the wine and beverage production
• transfer of the lecture content into simulated quality related case study – e.g. creating HACCP concept</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="6">Lecture (60%), Seminar (20%), Excursion (20%)</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="6">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="3">Courses</td><td></td><td></td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>31,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>52,5</td><td>52,5</td><td></td><td>20</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="6">Case Study</td></tr>
<tr><td>Determination of the module grade</td><td colspan="6">100 % Case Study</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="6">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="6">5 of 116 CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="4">Annual, winter semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="6">English</td></tr>
</table>

140 Future Technologies in Enology		1. Sem.	5 CP
Literature	• Boulton, R.B., Singleton, V.L., Bisson, L.F., Kunkee, R.E (1999). Principles and Practices of Winemaking. Springer Verlag. ISBN: 978-0-8342-1270-1 • Romano, P., Ciani, M., Fleet, G. H. (2019). Yeasts in the Production of Wine, Springer Verlag. ISBN: 978-1-4939-9780- 0 • Ribéreau-Gayon, P., Dubourdieu, D., Donèche, B., Lonvaud, A. (2006). Handbook of Enology: Volume 1: The Microbiology of Wine and Vinifications. Wiley Verlag. ISBN: 978-0-4700- 1034-1 • Ribéreau-Gayon, P., Glories, Y., Maujean, A. (2006). Handbook of Enology: Volume 2: The Chemistry of Wine: Stabilization and Treatments. Wiley Verlag. ISBN: 978-0- 4700-1037-2 • Morata, A. (2018). Red Wine Technology. Elsevier Verlag. ISBN: 978-0-1281-4399-5 • Hamatschek, J. (2015). Die Technologie des Weines. Ulmer Verlag. ISBN: 978-3-8001-7959-6 • Schmidt, O. (2013). Moderne Kellertechnik. Ulmer Verlag. ISBN: 978-3-8001-5681-8 • Rhein, O. H., Bach, H. P., Troost, G. (2010). Sekt, Schaumwein, Perlwein. Ulmer Verlag. ISBN: 978-3-8001- 6412-7 • Ribéreau-Gayon, P., Dubourdieu, D., Donèche, B., Lonvaud, A. (2006). Handbook of Enology: Volume 1: The Microbiology of Wine and Vinifications. Wiley Verlag. ISBN: 978-0-4700- 1034-1 • Ribéreau-Gayon, P., Glories, Y., Maujean, A. (2006). Handbook of Enology: Volume 2: The Chemistry of Wine: Stabilization and Treatments. Wiley Verlag. ISBN: 978-0- 4700-1037-2 • Jackson, R.S., Wine Science, Principles and Applications (2014), 4th edition. Academic Press; Print Book ISBN : 9780123814685, eBook ISBN: 9780123814692 – 968 pg • Robinson, J., Harding, J. (2015) The Oxford Companion to wine, Oxford University Press, 4rd edition • Moreno-Arribas, M. V., Polo, M. C. Wine Chemistry and Biochemistry, Springer New York, 2009, pg 735, ISBN 978-0- 387-74116-1 • Morata, A., Red Wine Technology (2019), Academic Press, Elsevier, UK, 392 pg, ISBN 978-0-12-814399-5		

150 Customer-centric Product Development

150 Customer-centric Product Development		1. Sem.	5 CP
Institute	Weincampus Neustadt		
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B		
Module coordinator	Prof. Dr. Laura Ehm		
Lecturers	Prof. Dr. Laura Ehm, Prof. Dr. Ulrich Fischer, Dr. Armin Schüttler		
Requirements			
Learning outcomes	**Consumer Research and Behavior** The students • name the key issues of consumer behavior research, the basics of market analysis, innovation management, and product development. • derive well-founded recommendations for action concerning the decision-making fields of product policy discussed. • explain the fundamental influencing factors of consumer behavior. • derive context-specific recommendations for the use of marketing tools and particularly product development. • describe how consumers process information related to purchasing decisions and can, based on this, outline the design aspects for marketing at each stage of the information processing process. • theoretically explain buying behavior or purchasing decisions. • explain the process of market and consumer research, especially important concepts, methods, and analytical tools used in data collection and analysis, can classify their respective strengths and weaknesses, apply them, and independently design and conduct simple studies (theoretically develop study design/hypotheses, collect data, process, analyze, verify hypotheses, and derive recommendations). • explain the areas of consumer research and product design in their respective conception, scientific discussion and application to business management problems, question them critically and apply them appropriately to the wine industry. **Sustainable Product Development** The students • analyze the causal relationships between origin, production and product. • develop conclusions for sustainable product development of special wine styles. • generate hypotheses on the needs and necessities in the product portfolio of wineries around the globe. • explain processes in production planning. • develop oenological products with a focus on sustainability. • evaluate the feasibility and risks of product development. **Special Methods of Sensory Case Studies** The students • assess the role of sensory analysis in oenology, product development and quality control. • derive well-founded recommendations for action at all stages of winemaking and wine sales. • acquire an overview of special methods in the field of sensory analysis, which are carried out with trained panels, experts, but also with consumers. • explain the physiological and psychological basis for inter-individual deviations in performance and preference formation of sensory tasters and consumers. • carry out univariate and multivariate statistical analyses of sensory tests and how to interpret them correctly using the results. • develop skills in order to combine data sets from analytical sensory analysis with information from consumer research. • generate working hypotheses and critically scrutinize results and translate them into instructions for action.		

<table>
<tr><th colspan="3">150 Customer-centric Product Development</th><th>1. Sem.</th><th>5 CP</th></tr>
<tr><td colspan="2">Module content</td><td colspan="3">Consumer Research and Behavior
Basics of consumer behavior, theoretical approaches, central constructs and models to explain consumer behavior from a marketing perspective as well as empirical findings of consumer behavior research
Types of purchase decisions and phases of the purchasing process
Importance of consumer behavior for marketing strategies and marketing tools, particularly regarding product design (e.g., product and quality assessment, product innovations, brand policy)
Process of market and consumer research, common methods and tools of data collection, data analysis, interpretation, and derivation of recommendations as a basis for strategy development in marketing and product management
Management of innovation and product development processes (New Product Development Process) from idea generation and concept development to concept testing, concept evaluation and selection, including profitability considerations and market launch strategies, taking into account preference theory and consumer behavior-related aspects, brand management requirements and specific features of wine marketing against the background of changing target groups and consumer needs
Sustainable Product Development
Seminar with keynote speeches, group work and moderated discussions to
Analyzing the connections between origin, production and product in the form of group work
Generation of conclusions for the product development of special wine styles.
Creation of hypotheses on requirements and needs and necessities in the product portfolio
Implementation of processes in production planning and development of oenological products
Evaluation of the prospects of success, feasibility and risks in product development.
Special Methods of Sensory Case Studies
Physiological and psychological principles of the function of the human sensory organs, the peripheral and central processing of sensory signals and causes of inter-individual variance in sensory perception and hedonic preference formation.
Process of sensory analysis: Objectives, implementation, tester requirements, evaluation and interpretation of sensory tests: difference tests, threshold determination, scale-based descriptive analysis, flash analysis, flash profiling, CATA/RATA, time-based analyses, qualitative wine evaluation systems and evaluation of emotional reactions of consumers.
Application of the statistical methods binomial tests, logistic regression, regression/correlation, analysis of variance, principal component analysis, PLSR, internal and external preference mapping, non-linear tests.
Procedures for the selection, training and performance testing of analytic and consumer panels. Management of a sensory panel and sensory quality management.
Appropriate selection of special sensory methods for solution of exemplary challenges in the evaluation of raw materials, during winemaking, in product development, in customer communication, in quality management.</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="3">Lecture (80%), Seminar (20%)</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="3">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="3">Courses</td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>42</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Challenge-based Learning</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>52,5</td><td>52,5</td><td></td><td></td><td>125</td></tr>
</table>

<table>
<tr><th colspan="3">150 Customer-centric Product Development</th><th>1. Sem.</th><th>5 CP</th></tr>
<tr><td rowspan="4">Module exam</td><td>Exam type</td><td colspan="3">Case Study, Scientific Report or Case Studies</td></tr>
<tr><td>Determination of the module grade</td><td colspan="3">Case Study (40%), Scientific Report (60%) or Case Studies (100%)</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="3">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="3">5 of 116 CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="2">Annual, winter semester</td><td>Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="3">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="3">Consumer Research and Behavior
The latest editions of the following textbooks are recommended:
• Armstrong, Gary, Kotler, Philip & Opresnik, Marc Oliver: Marketing: An Introduction, Global Edition, Pearson, London.
• Homburg, Christian, Kuester, Sabine & Krohmer, Harley: Marketing Management: A Contemporary Perspective, McGraw-Hill, Maidenhead, UK.
• Kotler, Philip & Armstrong, Gary: Principles of Marketing, Global Edition, Pearson, London.
• Hoyer, Wayne D., Deborah J. MacInnis & Rik Pieters: Consumer Behavior, South-Western, Mason, OH.

Further literature, in particular papers from renowned journals, will be provided during the course.
Sustainable Product Development

Special Methods of Sensory Case Studies
• Lawless, H., Heymann, H. Sensory Evaluation of Food, Springer-Verlag New York, 2010 – 480 pg, 978-1-4419-6487-8
• Civille, G. V., Carr, B. T., Sensory Evaluation Techniques, Fifth Edition, 2015 – 480 pg., Apple Academic Press Inc., ISBN 978 1482216905
• Jackson, R. S., Wine Tasting – a professional Handbook, 2nd Edition, Elsevier Inc., 2009, 512 pg, ISBN: 978-0-12-374181-3
• Piggott, J. Alcoholic beverages – Sensory evaluation and consumer research, Wood Head Publishing, Cambridge, UK, 2012, 491 pg, ISBN:978-0-08-101652-7
• Heymann, H., Ebeler, S. Sensory and Instrumental Evaluation of Alcoholic Beverages, 2017, Academic Press, UK, 265 pg ISBN 978-0-12-802727-1
• O'Mahoney, M., Sensory Evaluation of Food: Statistical Methods and Procedures, 1986, 502 pg, Marcel Dekker Inc, ISBN 978-0824773373</td></tr>
</table>

160 Core Competences Biology and Ecology of the Vine

160 Core Competences Biology and Ecology of the Vine	**1 Sem.**	**5 CP**
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan B	
Module coordinator	Prof. Dr. Jochen Bogs	
Lecturers	Dr. Wegmann-Herr, Dr. Carina Lang, Dr. Falk Behrens, Dr. Oliver Trapp, Dr. Birgit Eisenmann, Dr. Patrick Winterhagen, Prof. Dr. Jochen Bogs,	
Requirements	None	
Learning outcomes	The students **161: Grapevine Physiology, Biochemistry and Genetics** • name the functions of the most important vine organs • describe the basics of plant physiology and the synthesis of quality-forming constituents of the grape and their regulation by genetic factors and environmental influences. • identify and assess the most important phases of vine development and in particular berry development. • explain the influence of climate and different abiotic environmental factors on the vitality of soil and vine. • describe adaptation strategies to abiotic stress. • transfer the adaptation reactions of the vine to different environmental conditions. • evaluate the methods of breeding and modern biotechnology. • examine and evaluate the contribution of grapevine breeding to resistance breeding and quality viticulture. **162. Vine Ecology: Climate, Soil, Biotic and Abiotic Stress** • describe the interrelationships of soil components and the physical, chemical and biological processes in the soil, • describe the effects of soil management measures on the qualitative and quantitative performance of the vine. • take into account the importance of the sustainability of the vineyard soils. • explain the preservation and promotion of fertility and productive capacity as well as the ecological functions of soils. • identify the most important harmful fungi and animal pests of vines and grapes. • explain the most important control options against harmful fungi and pathogens and are able to adapt and apply them	
Module content	**161: Grapevine Physiology, Biochemistry and Genetics and abiotic stress** This course covers the fundamentals that are crucial for a healthy plant and the quality of the grapes and are therefore the basis for good winemaking. It introduces the various concepts of plant physiology, biochemistry, genetics and biotechnology. The influences of physiological relationships, genetics and environmental influences on vine growth and the synthesis of the most important ingredients are conveyed and discussed. Climate-related abiotic stress factors and possible adaptation strategies in viticulture are taught and discussed. Global growing regions and the influence of soils and climate on wine quality are presented. Varietal differences are taught and breeding objectives are defined against the background of current viticultural developments. The basics and methods of classical resistance breeding and biotechnology are taught. First, the principles and tools are introduced before the students work on concrete and published examples of the sub-areas and present and discuss them in a seminar. **Topics:** • Grapevine morphology and anatomy • Basics of vine physiology • Berry development and ingredients • Vegetative development • Influence of the environment on vegetative and generative development • Climate, influence on vines (temperature, drought, heat, frost, etc.) Examples of abiotic stress; sunburn, drought stress, etc. • Genetics and breeding • Basics of genetics • Genetic variability and grape varieties, cultivars and clones • Underlay vines • World viticulture, growing regions • Influence of soil and climate on wine quality • Fundamentals of breeding and biotechnology • Breeding programs, resistant varieties	

<table>
<tr><td colspan="2"></td><td colspan="5">162. Vine Ecology: Climate, Soil, Biotic and Abiotic Stress
Knowledge of soil components, their interrelationships and the physical, chemical and biological processes in the soil should enable students to optimize soil care, fertilization and vine nutrition. Under the premise of sustainability of soil fertility and soil performance, students should be enabled to manage vineyard soils sustainably without impairing the environment and the vitality of the vines. The influence of the climate and the various abiotic environmental factors on soil and vines will be taught and adaptation strategies identified and developed. Students are shown the most important pathogens in viticulture and are taught possible control strategies within the framework of the concept of integrated and ecological plant protection. The influence of climate on pathogens will be demonstrated.

Soil, environmental influences, abiotic stress
• Basics of the soil
• Soil microbiology, soil physics and chemistry, viticultural soil science, hydrogeology, influence of climate and its changes
• Ecology and function of the soil
• Importance of vine nutrition and fertilization
• Water balance

Biotic stress: vine diseases and plant protection strategies
• Insects and viruses
• Powdery & downy mildew, botrytis and vinegar rot
• Strategies in plant protection, PPP, organic & integrated, PPP application
• Climate-related diseases of the vine</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="5">Lecture, Seminar</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="5">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="4">Courses</td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>36</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>6</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>42</td><td>62</td><td></td><td>21</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="5">Written Examination</td></tr>
<tr><td>Determination of the module grade</td><td colspan="5">100 % Written Examination</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="5">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="5">0 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="4">Annual, winter semester</td><td>Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="5">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="5">• Grapevine Molecular Physiology & Biotechnology
Editors: Roubelakis-Angelakis, Kalliopi A. (Ed.) ISBN 978-90-481-2305-6
• Methodologies and Results in Grapevine Research
Herausgeber: Delrot, S., Medrano, H., Or, E., Bavaresco, L., Grando, S. (Eds.)
• Biochemistry of the Grape Berry
von Hernâni Gerós (Author), Manuela Chaves (Editor), Serge Delrot (Editor) ISBN-10: 160805540X
• The Science of Grapevines
Markus Keller ISBN: 9780128163658
• Biochemistry & Molecular Biology of Plants
Bob B. Buchanan (Herausgeber), Wilhelm Gruissem (Herausgeber), Russell L. Jones (Herausgeber)
ISBN-13: 978-0943088396
• Plant Pathology
George N. Agrios, Elsevier Academic Press
ISBN 0-12-044565-4
• Essential Plant Pathology
Gail L. Schumann; Cleora J. DÁrcy; APS Press
ISBN 13: 978-089054-342-9</td></tr>
</table>

170 Core Competences Enology

170 Core Competences Enology	1. Sem	5 CP
Institute / Faculty	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan B	
Module coordinator	Prof. Dr. Dominik Durner	
Lecturers	Prof. Dr. Dominik Durner, Prof. Dr. Lena Keller, Prof. Dr. Maren Scharfenberger-Schmeer, Prof. Dr. Ulrich Fischer, Prof. Dr. Jochen Bogs, Dr. Pascal Wegmann-Herr	
Requirements	Basic knowledge in wine production and sensory description recommended	
Learning outcomes	Upon completion of the module, students will have the competence to evaluate different process steps in wine production. In addition, students will be able to assess various styles and types of wine. The students • define oenological principles of winemaking and list their chronological process. • name the most important constituents of the grape and the wine • describe and assess maturity of the grape • implement strategies to reduce damage to the grape during harvest • choose between different press and maceration techniques • choose between different ways of must clarification • list all relevant filtration processes and pumps and their application • calculate the necessary amount of sugar for the chaptalization process to achieve certain alcohol and sugar contents • regulate the fermentation process • describe the role of yeast and lactic acid bacteria in the fermentation and in malolactic fermentation of wine • describe and categorize white wine, red wine, sparkling wine and alternative wine styles • determine the most important chemical and physical parameters required for operational parameters using rapid and reference methods and indicate the order of magnitude of their concentration • name and identify off-flavors in wine • optimize the physical and microbiological stability of wine differentiate between the basic features of white and red winemaking as well as the production process of sparkling wine, orange wine, Pét Nat and alcohol-free wine	
Module content	**Sensory Analysis, Wine Chemistry and Analytics and applied Enology** This course covers the essential aspects of sensory analysis, wine analysis, and wine chemistry, which are crucial for assessing grape maturity, identifying wine faults and off-flavors, and performing analytical evaluation of wine. Furthermore, the certification process for quality wine, as well as the physical and microbiological stabilization and bottling of wine, are elucidated. Sensory analysis and descriptions of different wine types, as well as alternative wine styles and current trends, are conveyed and discussed. The course furthermore focuses on the practical aspects of applied enology, which are fundamental for winemaking. The emphasis is on the various production stages and covers essential techniques in grape handling, fermentation control, filtration, and wine fining, with a focus on modern production methods. Topics: • grape maturity assessment • harvest and grape transport • pressing and preclarification • lees filtration and further must clarification and treatment • fermentation control and regulating the fermentation rate • basics on alcoholic and malolactic fermentation in wine • basics on wine relevant yeasts and bacteria • basics of modern production techniques, including pumps and filtration systems • wine faults and off-flavors • analytics of wine • certification process for quality wine • physical and microbiological wine stabilization and bottling	

<table>
<tr><td colspan="2"></td><td colspan="5">• various techniques for wine fining
• sensory analysis and descriptions of different wine types
• Application of barrels and wooden materials in winemaking, filtration, and wine fining, with a focus on modern production methods.</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="5">Lecture, seminar</td></tr>
<tr><td rowspan="9">Workload in hours</td><td>Workload in total</td><td colspan="5">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="4">Courses</td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>27</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>15</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>42</td><td>62</td><td></td><td>21</td><td>125</td></tr>
<tr><td rowspan="4">Module exam</td><td>Examination form(s)</td><td colspan="5">Written Examination (120 minutes)</td></tr>
<tr><td>Formation of the module grade</td><td colspan="5">100 % Written Examination</td></tr>
<tr><td>Prerequisite for awarding credit points</td><td colspan="5">Passing the final module examination.</td></tr>
<tr><td>Importance of the grade in the final grade</td><td colspan="5">0 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="3">Annually, winter semester</td><td colspan="2">Duration: 1 semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="5">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="5">• Boulton, Roger B. (1999): Principles and practices of winemaking; Gaithersburg, Md.: Chapman & Hall, (The Chapman & Hall food science book); ISBN 0-8342-1270-6
• Heymann, Hildegarde (2017): Sensory and instrumental evaluation of alcoholic beverages / Hildegarde Heymann, Susan E. Ebeler. - Amsterdam; Boston; Heidelberg; London; New York; Oxford; Paris; San Diego; San Francicso; Singapore; Sydney; Tokyo: Academic Press; ISBN 978-0-12-802727-1 - ISBN 0-12-802727-4
• Iland, Patrick; Bruer, Nick; Wilkes, Eric (2004): Chemical Analysis of Grapes and Wine: Techniques and Concepts: - Adelaide: Patrick Iland Wine Promotions; ISBN 978-0958160513 - ISBN 0958160511
• Iland, Patrick; Bruer, Nick; Erwart, Andrew; Markides, Andrew; John Sitters (2012): Monitoring the Winemaking Process from Grapes to Wine: Techniques and Concepts / - 2. ed. - Adelaide: Patrick Iland Wine Promotions; ISBN 9780958160568 - ISBN 095816052X
• König, Helmut; Unden, Gottfried; Fröhlich, Jürgen (Hg.) (2017): Biology of Microorganisms on Grapes, in Must and in Wine. Berlin and Heidelberg, Germany: Springer International Publishing (SpringerLink Books); ISBN 3319867601
• Ribéreau-Gayon, Pascal; Dubourdieu, Denis; Donèche, Bernard B.; Lonvaud, Aline A. (2021): Handbook of Enology. The microbiology of wine and vinifications. Chichester: Wiley (Handbook of enology / Pascal Ribéreau-Gayon, Vol. 1); ISBN 978-1119584681
• Ribéreau-Gayon, Pascal; Dubourdieu, Denis; Glories Yves; Maujean Alain (2021): Handbook of Enology. The Chemistry of Wine Stabilization and Treatments. Chichester: Wiley (Handbook of enology / Pascal Ribéreau-Gayon, Vol. 2); ISBN 9781119588498</td></tr>
</table>

210 Professional Integration and Transformation 2

210 Professional Integration and Transformation 2						**2. Sem.**	**10 CP**
Institute		Weincampus Neustadt					
Usability of the module		MSc Viticulture and Enology: Plan A					
Module coordinator		Prof. Dr. Lena Keller					
Lecturers		All full-time lecturers					
Requirements		Practice contract with cooperation company					
Learning outcomes		Building on module 110 students will collaborate with their respective companies to enhance their competencies within the specific operational fields of the companies in the following areas: The students **Industry-Specific Knowledge:** • distinguish key aspects of the wine industry, including process engineering, regulatory affairs, precision viticulture, and R&D. • analyze and evaluate industry practices and innovations. **Research and Analytical Skills:** • identify and frame research questions relevant to both the enterprise and the broader industry. • conduct independent research, including data collection, analysis, and interpretation. **Practical Application:** • apply theoretical knowledge to practical challenges within a professional setting. • develop solutions and recommendations based on research findings. **Project Management:** • plan, execute, and manage a research project from inception to completion. • manage time and resources effectively while advancing their project. **Communication and Presentation:** • present research findings in a clear and professional manner. • communicate complex ideas effectively to both technical and non-technical audiences. **Professional Integration:** • justify their (group-)work results. • develop a professional network within the viticulture and enology sector.					
Module content		In the "Professional Integration and Transformation" module, students conduct in-depth investigations into critical aspects of the wine industry within their cooperative company. This module offers four elective topics from which students, in collaboration with their company-supervisor, select a relevant and compelling focus question. In coordination with their cooperative company and supervising professors, they then address this question, either independently or within a team they lead. The students can choose from the following topics: **Process Engineering**: Focusing on the technological processes involved in wine production. **Regulatory Affairs Management**: Examining the legal and regulatory frameworks governing the wine industry. **Precision / Sustainable Viticulture**: Exploring modern techniques and sustainable practices in viticulture. **R&D in Grape and Wine Production**: Investigating innovative research and development practices in grape and wine production.					
Teaching and learning methods		Practice phase, challenge-based learning					
Workload (hours)	Workload in total	250 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture						
	Supervision	10,5					
	Laboratory						
	Challenge-based Learning	220					
	Total	230,5			19,5	250	
u — e	Exam type	e-Portfolio or practice-integrating Assignments					

210 Professional Integration and Transformation 2			2. Sem.	10 CP
	Determination of the module grade	100 % Portfolio or 100% practice-integrating Assignments		
	Prerequisite for the award of credit points	Passing the final module examination		
	Weighting for overall grade	0 of 116 CP for Plan A		
Offer frequency		Annual, summer semester	Duration: 1 Semester	
Teaching Language		English		
Literature		• Jamie Goode, The Science of Wine: From Vine to Glass: From Vine to Glass, ISBN 978-0520379503, 2021 • Ronald S. Jackson, Wine Science - Principles and Applications, ISBN 978-0128161180, 2020 • Lory Mitchell Wingate, Project Management for Research and Development, ISBN 978-1466596290, 2014		

220 Ecology, Sustainability and Management in Viticulture

220 Ecology, Sustainability and Management in Viticulture	2. Sem	5 CP
Institute / Faculty	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Leonard Pfahl	
Lecturers	Leonard Pfahl, Karin Franzen, Dr. Robert Richter, Dr. Falk Behrens	
Requirements	Basic knowledge in Biology and Ecology of the Vine (Module 170) recommended	
Learning outcomes	Upon completion of the module, students will have the competence to evaluate the grape production of a winery or grape grower terms of environmental and economic sustainability. In addition, students will be able to develop and monitor short and long-term strategies to increase sustainability in grape production, adapted to the specific conditions of the winery or grape grower. In detail, the competences are divided into three areas. The students **221: Ecology and biodiversity in the vineyard** • describe biodiversity in the context of a vineyard and the surrounding areas. • draw conclusions from the impact of different viticultural practices on biodiversity in the vineyard and surrounding areas. • take effective measures to increase biodiversity in the vineyard and surrounding areas. • implement strategies to reduce pesticide, nitrate and phosphate contamination of the ecosystems surrounding the vineyard. • assess soil properties, analyze soil parameters and evaluate soil health. • develop a strategy to improve soil health. • develop a site-specific fertilization strategy. • name and evaluate the available sustainable production certifiers and be able to choose one that suits the individual conditions of a winery. **222: Agricultural Meteorology and Precision Viticulture** • use disease forecasting models/ decision support systems to reduce the amount of pesticide applications. • implement, apply and monitor a farm management system in a winery. • set up the machinery for viticulture 4.0. • use meteorological stations and sensor technology to record and interpret meteorological data and vine growth parameters. • incorporate GIS-based data into decision making and vineyard management. **223: Viticultural Management and Technology** • define and monitor the production objective of a winery. • evaluate the impact of different viticultural practices on grape quality and yield-including different strategies to increase biodiversity. • apply techniques to reduce carbon dioxide emissions in the vineyard. • choose between different grape production systems to achieve individual production goals. • select site-specific rootstocks, grape varieties and training systems that are adapted to the winery's production and sustainability goals. • describe different modern spraying systems (recycling spraying technology, smart spray) and select according to the requirements of a winery or grape grower. • show opportunities to diversify a winery's income.		
Module content	• Description of the vineyard ecosystem, including the linkages and interactions between the different actors. • Assessment of soil health and soil properties. • Impact of pesticides/plant nutrients on the biodiversity of an ecosystem. • Sustainable fertilization strategies in viticulture. • Certification process and sustainability requirements • Description of the various techniques in the field of digital agriculture and precision viticulture. • Aspects of Agriculture 4.0 in the field of viticulture (farm management systems, sensor	

<table>
<tr><td colspan="2"></td><td colspan="5">technology, semi-automated driving, intelligent spraying solutions, ISOBUS)
• Modern production techniques (vineyard structure, training systems, mechanization, soil and inter-vine management, vineyard management, rootstocks and varieties)
• Case study: analyzing the current situation of a winery's grape production. Development of different strategies to increase sustainability and biodiversi1ty in the vineyard while modernizing vineyard management and achieving production targets.</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="5">Lecture, seminar, excursion</td></tr>
<tr><td rowspan="9">Workload in hours</td><td>Workload in total</td><td colspan="5">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="4">Courses</td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>19,5</td><td>21,5</td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td>12</td><td>42</td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>31,5</td><td>63,5</td><td></td><td>30</td><td>125</td></tr>
<tr><td rowspan="4">Module exam</td><td>Examination form(s)</td><td colspan="5">Case Study</td></tr>
<tr><td>Formation of the module grade</td><td colspan="5">100% Case Study</td></tr>
<tr><td>Prerequisite for awarding credit points</td><td colspan="5">Passing the final module examination.</td></tr>
<tr><td>Importance of the grade in the final grade</td><td colspan="5">5 of 116CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="3">Annual, summer semester</td><td colspan="2">Duration: 1 semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="5">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="5">• Borsato, E., Zucchinelli, M., D'Ammaro, D., Giubilato, E., Zabeo, A., Criscione, P., Pizzol, L., Cohen, Y., Tarolli, P., Lamastra, L., & Marinello, F. (2020). Use of multiple indicators to compare sustainability performance of organic vs conventional vineyard management. Science of the Total Environment, 711. https://doi.org/10.1016/j.scitotenv.2019.135081
• Cataldo, E., Salvi, L., Sbraci, S., Storchi, P., & Mattii, G. B. (2020). Sustainable Viticulture: Effects of Soil Management in Vitis vinifera. Agronomy, 10(12). https://doi.org/10.3390/agronomy10121949
• Constant, N., Auvergne, C., Fortin, N., Colin, E., & Gaviglio, C. (2019). L'entretien du sol: Réduire les coûts de production et la consommation en énergies fossiles.
• Costa, J. M., Catarino, S., Escalona, J. M., & Comuzzo, P. (2022). Improving Sustainable Viticulture and Winemaking Practices. In Improving Sustainable Viticulture and Winemaking Practices. Elsevier. https://doi.org/10.1016/C2020-0-01502-1
• Gerling, C. (2015). Environmentally Sustainable Viticulture: Practices and Practicality. Apple Academic Press. https://www.routledge.com/Environmentally-Sustainable-Viticulture-Practices-and-Practicality/Gerling/p/book/9781774633861
• Kaczmarek, M., Entling, M. H., & Hoffmann, C. (2023). Differentiating the effects of organic management, pesticide reduction, and landscape diversification for arthropod conservation in viticulture. Biodiversity and Conservation, 32(8–9), 2637–2653. https://doi.org/10.1007/s10531-023-02621-y
• Kaczmarek, M., Gillich, M., Entling, M. H., Hoffmann, C., & Schirmel, J. (2023). Differential responses of Orthoptera in vineyards to organic farming, pesticide reduction, and landscape heterogeneity. Journal of Insect Conservation, 27(5), 729–741. https://doi.org/10.1007/s10841-023-00493-9
• Litskas, V., Mandoulaki, A., Vogiatzakis, I. N., Tzortzakis, N., & Stavrinides, M. (2020). Sustainable viticulture: First determination of the environmental footprint of grapes. Sustainability (Switzerland), 12(21), 1–18. https://doi.org/10.3390/su12218812
• Recchia, L., Sarri, D., Rimediotti, M., Boncinelli, P., Cini, E., & Vieri, M. (2018). Towards the environmental sustainability assessment for the viticulture. Journal of Agricultural Engineering, 49(1), 19–28. https://doi.org/10.4081/jae.2018.586
• Thiollet-Scholtus, M., Muller, A., Abidon, C., Grignion, J., Keichinger, O., Koller, R., Langenfeld, A., Ley, L., Nassr, N., Rabolin-Meinrad, C., & Wohlfahrt, J. (2021). Multidimensional assessment demonstrates sustainability of new low-input viticulture systems in north-eastern France. European Journal of Agronomy, 123. https://doi.org/10.1016/j.eja.2020.126210
• Zambon, I., Colantoni, A., Cecchini, M., & Mosconi, E. M. (2018). Rethinking sustainability within the viticulture realities integrating economy, landscape and energy. Sustainability (Switzerland), 10(2). https://doi.org/10.3390/su10020320</td></tr>
</table>

230 Innovation in Biotechnology and Chemistry

230 Innovation in Biotechnology and Chemistry	2. Sem.	5 CP
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Prof. Dr. Maren Scharfenberger-Schmeer	
Lecturers	Prof. Dr. Maren Scharfenberger-Schmeer, Prof. Dr. Lena Keller	
Requirements	none	
Learning outcomes	**231: Chemistry and Biotechnology of Wine Making** The students • evaluate the microbiological opportunities and risks of fermentation processes for enhancing wine quality • discuss the metabolic pathways relevant to fermentation (yeasts and bacteria) on a genetic, molecular and cellular level • select fundamental strategies for solving specific analytical challenges, such as avoiding matrix effects • assess analytical methods required for detecting contaminants as well as for verifying the authenticity of grape variety, origin and vintage **232: Advanced Techniques in Instrumental Wine Analysis (optional)** Overview of current techniques and an understanding of their functionality in instrumental wine analysis. The students • evaluate the effectiveness of advanced analytical techniques in addressing specific enological questions • explain the operation of high-performance liquid chromatography (HPLC) and gas chromatography (GC) as well as coupling to mass spectrometry (MS) • evaluate chromatograms and spectra **233: Advanced Molecular Microbiological Analysis (optional)** The students • compare different microbiological techniques for the quantification of microorganisms in theory and practice • distinguish techniques for the unambiguous identification and evaluation of unknown microorganisms in theory and practice	
Module content	**231: Chemistry and Biotechnology of Wine Making** • deepening, influence and control of abiotic and biotic factors on alcoholic fermentation • biosynthesis of metabolic by-products: cell biology, regulation, functional genetic • backgrounds, technical implementation and opportunities of breeding, selection and recombination of yeasts and bacteria • biochemical significance and influence on the biosynthesis of phenols, flavour precursors and aroma compounds in the context of wine and sparkling wine fermentation • analysis of wine components: focus on polyphenols, aroma precursors, and aroma compounds • specialized techniques for identifying and quantifying key wine constituents **232: Advanced Techniques in Instrumental Wine Analysis (optional)** • aroma profiling using HS-SPME-GCMS • phenolic compound measurements in red wines • semi-synthetic production of polymeric wine pigments with data acquisition and qualitative analysis of an LC-MS/MS mass spectrum **233: Advanced Molecular Microbiological Analysis (optional)** • latest methods for identifying wine relevant microorganism in theory and practice, differentiation at species and strain level • latest methods for quantifying wine relevant microorganism in theory and practice (qPCR)	

<table>
<tr><td colspan="3">230 Innovation in Biotechnology and Chemistry</td><td colspan="3">2. Sem.</td><td>5 CP</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="4">Lecture (50%), Seminar (25%), Laboratory (25%)</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="4">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="2">Courses</td><td></td><td></td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>21</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td>10,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>42</td><td>63</td><td></td><td>20</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="4">presentation</td></tr>
<tr><td>Determination of the module grade</td><td colspan="4">100 % presentation</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="4">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="4">5 of 116 CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="3">Annual, summer semester</td><td>Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="4">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="4">• König, Helmut, Unden, Gottfried, Fröhlich, Jürgen (Eds.): Biology of Microorganisms on Grapes, in Must and in Wine, Springer, ISBN 978-3-319-60021-5, 2017
• Walker, G. M.: Yeast Physiology and Biotechnology, John Wiley & Sons New York, ISBN: 978-0-471-96446-9, 1998
• Fugelsang, KC, Edwards, CG: Wine Microbiology, Springer ISBN 978-0-387-33349-6, 2007
• Romano, Patrizia, Ciani, Maurizio, Fleet, Graham H. (Eds.): Yeasts in the Production of Wine, Springer ISBN 978-1-4939- 9782-4, 2019
• José Juan Mateo, Sergi Maicas: Non-Saccharomyces yeasts in wine production, Lambert ISBN: 3659490814, 2015
• Dorit-Elisabeth Schuller, Saccharomyces cerevisiae strains for winemaking, VDM Verlag, ISBN: 3639171748, 2009
• Skoog, Holler, Crouch: Principles of Instrumental Analysis, ISBN: 9781305577213, 2017
• Andrew Waterhouse, Gavin L. Sacks, David W. Jeffery, Understanding Wine Chemistry, ISBN 978-1-11989-407-0, 2024
• Clarke, RJ, Bakker, J: Wine Flavour Chemistry, Blackwell Publishing, ISBN 978-1-44433-042-7 , 2011</td></tr>
</table>

240 Management and Entrepreneurship in Wine

240 Management and Entrepreneurship in Wine	2. Sem.	5 CP
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Prof. Dr. Marc Dreßler	
Lecturers	Prof. Dr. Marc Dreßler, Prof. Dr. Laura Ehm	
Requirements	none	
Learning outcomes	**241: Sustainable Entrepreneurship and Wine Economics** The students • describe the value of entrepreneurism in a managerial context and in a globalised, networked world • analyse current conceptual approaches to entrepreneurship and categorise this in the context of family businesses, leadership and management • select specific tools and frameworks for strategic analyses and business model development • apply the concept of sustainability as a vehicle for strategic management and entrepreneurship. • actively utilize a portfolio of tools for strategic analyses and planning, sustainability and innovation management. **242: Wine Marketing** The students • examine the various categories of marketing objectives and the different levels of strategy and their relationships to one another. • evaluate the individual steps in the process of developing marketing strategies within a company. • independently select analytical tools for market analysis and strategy development and apply them confidently. • acquire in-depth knowledge in the area of operational marketing concerning product, price, communication, distribution policies, and customer relationship management. • apply the methods and tools to specific management problems. • identify sustainability aspects, changing target groups, and consumer needs in this context. • critically question the areas of strategic and operational marketing in their respective conception, scientific discussion, and application to specific management problems in light of current developments, and applying them appropriately to the wine industry.	

<table>
<tr><th colspan="6">240 Management and Entrepreneurship in Wine</th><th>2. Sem.</th><th>5 CP</th></tr>
<tr><td colspan="2">Module content</td><td colspan="6">241: Sustainable Entrepreneurship and wine economics
The module covers entrepreneurship and economics in a synchronized approach covering entrepreneurism from a societal aspect, entrepreneurship and decision making, strategic management, sustainability as a managerial framework, and management in the global wine industry by the following elements:
• entrepreneurship as a source for societal development
• effectuation and causation
• strategic management theory, concepts, frameworks and instruments
• sustainability paradigm, strategic benefits and innovation impulses
• operational sustainability – from challenges to solutions: a balanced scorecard approach
• sustainability in the wine industry: from positioning to economic value creation.

242: Wine Marketing
• Strategic marketing and the process of strategy development in marketing
• Market analysis: methods and tools for analyzing market transparency, analysis of the initial strategic situation, market potential analysis, forecasting techniques, analysis of the global business environment, market and competitive analysis, and company analysis
• Decision fields of operational marketing with regard to product and brand management, pricing, distribution and communication policies, and customer relationship management: product design, management of established products, the concept of “brand” and brand management
• Classical and behavioral pricing theory, price determination, design of discount and bonus systems, price enforcement
• Objectives and target groups of communication, communication budgets, design of communication campaigns, control of communication effectiveness
• Design of the sales system, design of relationships with distribution partners and key accounts, design of sales activities
• Methods and tools of customer relationship management / customer experience management (customer loyalty programs, complaint management, cross-selling, customer recovery, customer journey approach)

Reflection on the special features of the wine industry and important aspects of wine marketing against the background of changing target groups and consumer needs (green marketing, sustainability/climate protection, variety-seeking behavior, etc.).</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="6">Lecture (90%), Seminar (10%)</td></tr>
<tr><td rowspan="8">Workload (hours)</td><td>Workload in total</td><td colspan="6">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="3">Courses</td><td></td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>28,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>3</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>31,5</td><td>48</td><td></td><td>45,5</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="6">Assignment or Case study</td></tr>
<tr><td>Determination of the module grade</td><td colspan="6">100 % Assignment or 100% Case study</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="6">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="6">5 of 116 CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="4">Annual, summer semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="6">English</td></tr>
</table>

240 Management and Entrepreneurship in Wine	2. Sem.	5 CP
Literature	**241: Sustainable Entrepreneurship and Wine Economics** Textbook • Dressler, M., 2023. Strategic Entrepreneurship, UVK, Munich. Scientifically based articles • Dressler, M., 2019. The entrepreneurship power house of ambition and innovation: exploring German wineries. International Journal of Entrepreneurship and Small Business forthcoming. • Dyer, J.H., Gregersen, H.B., Christensen, C., 2009. Entrepreneurial behaviour, opportunity recognition, and the origins of innovative ventures. Strategic Entrepreneurship Journal 2, 317-338. • Haller, C., Santoni, J., Barth, I., Augarde, C., 2017. An understanding of peer support in an effectual entrepreneurial process: case of French wine-entrepreneurs. International Journal of Entrepreneurship and Small Business 32(1-2), 208-228. • Sarasvathy, S.D., 2001. Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. Academy of Management Review 26(2), 243-263. • Wach, D., Stephan, U., Gorgievski, M., 2016. More than money: Developing an integrative multi-factorial measure of entrepreneurial success. International Small Business Journal: Researching Entrepreneurship 34(8), 1098-1121. **242: Wine Marketing** *The latest editions of the following textbooks are recommended:* • Armstrong, Gary, Kotler, Philip & Opresnik, Marc Oliver: Marketing: An Introduction, Global Edition, Pearson, London. • Homburg, Christian, Kuester, Sabine & Krohmer, Harley: Marketing Management: A Contemporary Perspective, McGraw-Hill, Maidenhead, UK. • Kotler, Philip & Armstrong, Gary: Principles of Marketing, Global Edition, Pearson, London. • Hoyer, Wayne D., Deborah J. MacInnis & Rik Pieters: Consumer Behavior, South-Western, Mason, OH. *Further literature, in particular papers from renowned journals, will be provided during the course.*	

250 Climate change and Viticulture: Influences and Adaption Strategies

250 Climate change and Viticulture: Influences and Adaption Strategies	2. Sem.	5 CP
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan A, Plan B	
Module coordinator	Dr. Wegmann-Herr	
Lecturers	Dr. Wegmann-Herr, Prof. Dr. Jochen Bogs,	
Requirements	none	
Learning outcomes	**251 Impacts of climate change on viticulture** The students • transfer the actual scientific knowledge about climate change, including forecast models and the recent options for combating the effects of climate change, to the viticulture sector, oriented to the structure of the IPCC. • explain effects on winegrowing production and ecology on a long term scale including socio-economical risk calculation, based on Scientific aspects of climate change. • describe the overall impacts of climatic factors and soil characteristics and their interaction with viticultural practices (irrigation, soil preparation, cover crops; nutrient supply, soil microorganisms, interactions in the ecosystem) for the production of desired wine styles and yield. • assess and manage/correct the potential negative impacts of climate change in long term scenarios based on different models dealing with drought, radiation, frost, hail, high wind etc. and or soil (acidity, pH, erosion, poor organic matter content, salinity…). • evaluate/measure the climate and soil parameters in order to characterize current or new sites/terroir and being able notably to adapt the varieties and rootstocks to new sites and answer the market in terms of wine styles; to manage inputs (water, nutrient). • analyze the effects of climate change on vine plants and natural ecological systems at regional and global level • assess the economic consequences of global warming • evaluate measures to adapt to and mitigate climate change • evaluate the simulation of viticultural production systems for different locations using different management strategies • apply growth models to different climatic conditions • develop new approaches to growth models **252: Adaptation Strategies to climate change** The students • evaluate current adaption strategies and to explore new concepts • utilize effectively the latest technological and environmental advances into the production system with the intention of optimized climate change adaption and reduced resource consumption. • use and improve current platforms • critically review actual literature • write scientific papers covering different terrestrial ecosystems in recent and future winegrowing areas on different spatial and temporal scale levels.		
Module content	This module builds on the fundamentals and enables students to independently assess the current challenges and options for action and project them into the future based on knowledge. At the same time, students are taught the skills that ensure a sustainable entrepreneurial ability to act under constantly changing conditions. This includes strengthening the resilience of the viticulture sector to future biotic (e.g. new invasive pests, PPP-resistant fungi...) and abiotic factors (earthquakes, bush fires...) while also implementing innovative developments outside the viticulture sector. The learning form is offered in combination of scenario based learning and problem based learning. Journal club Exam/Case study: Paper writing / critical review/selected growing areas suited or not for viticulture and how to develop/evaluate strategies for the next 50-100 years. Resulting papers will be published after being reviewed in current trade journals.		
Teaching and learning methods	Lecture, Seminar, Case Study		

<table>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="5">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="4">Courses</td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>27</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>4,5</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>31,5</td><td>63,5</td><td></td><td>30</td><td>125</td></tr>
<tr><td rowspan="3">Module Exam</td><td>Exam type</td><td colspan="5">Case Study or Assignments or Presentation</td></tr>
<tr><td>Determination of the module grade</td><td colspan="5">100 % Assignment / Case study / Presentation</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="5">Passing the final module examination</td></tr>
<tr><td colspan="2">Weighting for overall grade</td><td colspan="5">5 of 116 CP for Plan A, 5 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="3">Annual, summer semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="5">English</td></tr>
<tr><td colspan="2">Literature</td><td colspan="5">• Viticulture and Winemaking under Climate Change
Agronomy Editors: Helder Fraga ISBN 978-3-03921-974-2
• Global Agricultural Production: Resilience to Climate Change
Springer Cham Editors: Mukhtar Ahmed ISBN 978-3-031-14972-6
• Global Climate Change and Environmental Policy Agriculture Perspectives
Springer
Nature Singapore Pte Ltd. 2020 Venkatramanan, Shah, Prasad ISBN 978-981-13-9570-3</td></tr>
</table>

260 Core Competences Viticulture

260 Core Competences Viticulture	**2. Sem.**	**5 CP**
Institute	Weincampus Neustadt	
Usability of the module	MSc Viticulture and Enology: Plan B	
Module coordinator	Dr. Robert Richter	
Lecturers	Dr. Robert Richter, Dr. Carina Lang, Leonard Pfahl, Dr. Matthias Trapp, Dr. Anna Kicherer, Dr. Pascal Wegmann-Herr	
Requirements	Basic knowledge in Biology and Ecology of the Vine (Module 160) recommended	
Learning outcomes	**261 Smart & Sustainable Viticulture and Meteorology** The students • explain key concepts, theories, and principles related to: ○ Usage of sensor technologies for remote sensing and climate monitoring. ○ Demonstrate fundamental understanding of ○ suitable sensor technologies according to the respective application. ○ agro-meteorological aspects. • explain key concepts, theories, and principles related to Sustainable Practices ○ Organic and biodynamic farming principles. ○ Certification processes for sustainable viticulture. ○ Environmental impact reduction. • critically analyze and evaluate ○ Climate change impact on Viticultural aspects. ○ Vineyard management practices focusing on sustainability and climate change adapted grape production **262 Viticultural practices** The students • explain key concepts, theories, and principles ○ related to relevant viticultural aspects of wine grape production ○ considering single vegetation period up to full vineyard life ○ the establishment of a vineyard related to cover cropping, soil health, mineralization, water retention • critically analyze and evaluate ○ Viticultural management options for influencing yield and quality parameters ○ the influence of weather, climate and microclimate on vineyard management options for stress, yield and quality parameters	
Module content	**261 Smart & Sustainable Viticulture and Meteorology** This master's module provides an in-depth exploration of the essential skills and knowledge required for smart and sustainable viticulture, including meteorological factors. Students will gain a comprehensive understanding of the principles of sustainable vineyard management, integrating advanced technological solutions to optimize vineyard performance and reduce environmental impact. The curriculum covers key areas such as precision viticulture, climate-smart agricultural practices, and the use of meteorological data to inform decision-making processes. By the end of the module, students will be adept at employing innovative tools and techniques to enhance grape production sustainably, analyzing climatic conditions to mitigate risks, and implementing strategies to improve vineyard resilience against climate variability. Through a combination of theoretical knowledge and practical applications, this module equips students with the expertise necessary to lead in the evolving field of sustainable viticulture, ensuring they are prepared to address the challenges and opportunities presented by a changing climate. Viticultural Technology: • Use of technology and equipment in vineyard management. • Vine physiology aware vineyard managed decisions • Data collection and analysis for decision-making. • Public-databases analysis for decision-making. Sustainable Practices: • Organic and biodynamic farming principles. • Environmental impact reduction.	

<table>
<tr><td colspan="2"></td><td colspan="5">• Climate, influence on vine growth and planting site decision (temperature, hail, rain, wind)
• Weather forecast models for informed decision making

262 Viticultural practices
This module provides an in-depth exploration of the essential competencies required for modern viticulture. Students will gain comprehensive knowledge of viticultural strategies and management options influencing vine growth and grape production. The module covers critical aspects of vineyard management, including soil preparation, cover cropping, water and nutrient demand, and sustainable viticulture techniques. Through a blend of theoretical instruction and seminar work, students will develop the skills necessary to manage a vineyard effectively, ensuring high-quality grape production. By the end of this module, students will be proficient in the core competencies of viticulture, equipped to implement best practices in vineyard management, by utilizing sustainable viticultural practices.
Topics:

• Comparison of grape production systems,
• Viticultural machines and technologies.
• Labor intensity and time window of all regular vineyard work
• Viticultural work in the temporal context of vine development during the vegetation period and in the context of the rotation cycle of a vineyard
○ Vineyard Design and Planting
○ Canopy Management
○ Water Management
○ Wheatear- Climate impact Management
○ Harvest Management
○ Soil Management
○ Nutrient Management</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="5">Lecture, Seminar</td></tr>
<tr><td rowspan="9">Workload (hours)</td><td>Workload in total</td><td colspan="5">125 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="2">Courses</td><td></td><td></td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td>36</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>6</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Exercise</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>42</td><td>62</td><td></td><td>21</td><td>125</td></tr>
<tr><td rowspan="4">Module Exam</td><td>Exam type</td><td colspan="5">Written Exam (120 min)</td></tr>
<tr><td>Determination of the module grade</td><td colspan="5">100 % Written Exam</td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="5">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="5">0 of 125 CP for Plan B</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="3">Annual, summer semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="2">Teaching Language</td><td colspan="5">English</td></tr>
</table>

Literature	**Production orientated Literature** Sunlight into Wine: A Handbook for Winegrape Canopy Management by Richard Smart and Mike Robinson - A practical guide to understanding and managing grapevine canopies to improve fruit quality and yield. General Viticulture by A.J. Winkler, James A. Cook, William M. Kliewer, and Lloyd A. Lider - A comprehensive textbook covering all aspects of viticulture, from the biology of the vine to vineyard management and production. Wine Science: Principles and Applications by Ronald S. Jackson - An in-depth resource that covers the scientific principles underlying wine production, including grapevine physiology and vineyard management. Viticulture: An Introduction to Commercial Grape Growing for Wine Production by Stephen Skelton MW - A concise introduction to the principles of viticulture, ideal for those new to the field or considering a career in wine production. **Advanced Literature** 1. "The Science of Grapevines: Anatomy and Physiology" by Markus Keller - A detailed exploration of grapevine biology, focusing on the physiological processes that affect vine growth and fruit production. 2. "Viticulture and Environment" by John Gladstones - An advanced analysis of the interactions between grapevines and their environment, including climate, soil, and topography. 3. "Wine Grapes: A Complete Guide to 1,368 Vine Varieties, Including Their Origins and Flavours" by Jancis Robinson, Julia Harding, and José Vouillamoz - An encyclopedic reference that delves into the genetics, history, and characteristics of wine grape varieties worldwide. 4. "Biology of the Grapevine" by Michael G. Mullins, Alain Bouquet, and Larry E. Williams - A scientific examination of grapevine biology, including genetics, physiology, and development. 5. "Grapevine Breeding Programs for the Wine Industry" edited by Andrew G. Reynolds - A comprehensive overview of modern grapevine breeding techniques and their applications in developing new cultivars for wine production. 6. "Vineyard Ecosystems: Management for a Sustainable Future" by Mary Willis - An advanced text focusing on the ecological aspects of vineyard management and sustainable viticulture practices. **Specialized Topics** 1. "Soil Management in Vineyards: Best Practices" by Michael F. Barth - A specialized book on soil health and management practices tailored to vineyards. 2. "Water Management in Vineyards: Efficient Irrigation Practices" by Pietro Sala - Focuses on advanced irrigation techniques and water management strategies in viticulture. 3. "Grapevine Nutrition and Fertilization: Principles and Practices" by John W. Ficklin - An advanced guide to the nutritional requirements of grapevines and effective fertilization strategies. • Methodologies and Results in Grapevine Research Herausgeber: Delrot, S., Medrano, H., Or, E., Bavaresco, L., Grando, S. (Eds.) • Droulia F, Charalampopoulos I. Future Climate Change Impacts on European Viticulture: A Review on Recent Scientific Advances. Atmosphere. 2021; 12(4):495. https://doi.org/10.3390/atmos12040495

270 Science in Practice: Management and Language Skills

270 Science in Practice: Management and Language Skills						2. Sem.	5 CP
Institute		Weincampus Neustadt					
Usability of the module		MSc Viticulture and Enology: Plan B					
Module coordinator		Prof. Dr. Maren Scharfenberger-Schmeer					
Lecturers		Michael Wingens, Harry Sponheimer					
Requirements		none					
Learning outcomes		**271: Experimental Design and Project Management** The students • understand the principles and methods of experimental design. • formulate hypotheses and develop appropriate experimental strategies. • apply statistical methods to analyze experimental data, including the use of data analysis software. • acquire analytical and critical thinking skills to interpret data and draw informed conclusions. • acquire skills in scientific communication. • learn how to plan projects properly, including setting goals and organizing the working day. • acquire the ability to work in a project- and team-orientated manner. **272: Wine-specific English** The students • understand the main content of complex texts on concrete and abstract topics. • understand specialized discussions in their own area of specialization. • communicate so spontaneously and fluently that a normal conversation with native speakers is possible without great effort on either side. • express themselves clearly and in detail on a wide range of topics. • explain a point of view on a topical issue and state the advantages and disadvantages of various options.					
Module content		**271: Experimental Design and Project Management** • prepare students to design, conduct and analyze scientific experiments and to manage projects effectively. • Introduction of the principles of experimental design, including hypothesis generation, independent and dependent variables, control and replication • analysis of real experiments will illustrate the application of experimental designs and statistical methods. • basics of project management, including project planning, execution and monitoring, as well as the use of project management tools **272: Wine-specific English** • Intensifying technical language in viticulture and oenology • Reading and writing scientific texts • Creating Power Point presentations • Correspondence • Wine blogs • Job applications • Preparation for taking on a job in an English speaking country					
Teaching and learning methods		Lecture, Seminar					
Workload (hours)	Workload in total	125 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture	21					
	Seminar	21					
	Laboratory						
	Exercise						
	Field trip						
	Total	42	63		20	125	

270 Science in Practice: Management and Language Skills			2. Sem.	5 CP
Module exam	Exam type	Presentation		
	Determination of the module grade	100 % Presentation		
	Prerequisite for the award of credit points	Passing the final module examination		
	Weighting for overall grade	0 of 120 CP for Plan B		
Offer frequency		Annual, summer semester	Duration: 1 Semester	
Teaching Language		English		
Literature		Recommended by the lecturer		

310 Professional Integration and Transformation 3

310 Professional Integration and Transformation 3						3. Sem.	9 CP
Institute		UHA					
Usability of the module		MSc Viticulture and Enology: Plan A					
Module coordinator		Dr. Romain Pierron					
Lecturers		All full-time lecturers					
Requirements		Practice contract with cooperation company					
Learning outcomes		Building on modules 110 and 210 students will collaborate with their respective companies to enhance their competencies within the specific operational fields of the companies in the following areas: The students **Industry-Specific Knowledge:** • distinguish key aspects of the wine industry, including process engineering, regulatory affairs, precision viticulture, and R&D. • analyze and evaluate industry practices and innovations. **Research and Analytical Skills:** • identify and frame research questions relevant to both the enterprise and the broader industry. • conduct independent research, including data collection, analysis, and interpretation. **Practical Application:** • apply theoretical knowledge to practical challenges within a professional setting. • develop solutions and recommendations based on research findings. **Project Management:** • plan, execute, and manage a research project from inception to completion. • manage time and resources effectively while advancing their project. **Communication and Presentation:** • present research findings in a clear and professional manner. • communicate complex ideas effectively to both technical and non-technical audiences. **Professional Integration:** • justify their (group-)work results. • develop a professional network within the viticulture and enology sector.						
Module content		In the "Professional Integration and Transformation" module, students conduct in-depth investigations into critical aspects of the wine industry within their cooperative company. This module offers four elective topics from which students, in collaboration with their company-supervisor, select a relevant and compelling focus question. In coordination with their cooperative company and supervising professors, they then address this question, either independently or within a team they lead. The students can choose from the following topics: **Process Engineering**: Focusing on the technological processes involved in wine production. **Regulatory Affairs Management**: Examining the legal and regulatory frameworks governing the wine industry. **Precision / Sustainable Viticulture**: Exploring modern techniques and sustainable practices in viticulture. **R&D in Grape and Wine Production**: Investigating innovative research and development practices in grape and wine production.						
Teaching and learning methods		Practice phase, challenge-based learning					
Workload (hours)	Workload in total	225 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture						
	Supervision	10,5					
	Laboratory						
	Challenge-based Learning	195					
	Total	205,5			19,5	225	
u — e	Exam type	e-Portfolio or practice-integrating Assignments or presentation					

310 Professional Integration and Transformation 3			3. Sem.	9 CP
	Determination of the module grade	100 % Portfolio or 100% practice-integrating Assignments or 100% presentation		
	Prerequisite for the award of credit points	Passing the final module examination		
	Weighting for overall grade	0 of 116 CP for Plan A		
Offer frequency		Annual, winter semester	Duration: 1 Semester	
Teaching Language		English		
Literature		• Jamie Goode, The Science of Wine: From Vine to Glass: From Vine to Glass, ISBN 978-0520379503, 2021 • Ronald S. Jackson, Wine Science - Principles and Applications, ISBN 978-0128161180, 2020 • Lory Mitchell Wingate, Project Management for Research and Development, ISBN 978-1466596290, 2014		

320 Project ChemWine

320 Project ChemWine						3. Sem.	9 CP
Institute		UHA					
Usability of the module		MSc Viticulture and Enology: Plan A					
Module coordinator		Dr. Romain Pierron					
Lecturers							
Requirements		Knowledge of module 120 is recommended					
Learning outcomes		The students • utilize software for text processing, visual media creation, and statistical analysis to analyze and present relevant industry problems, • apply tools for chemical and sensory wine analysis and adapt them to market needs, • employ statistical methods for process control and experimental analysis to optimize wine analyses and draw scientific conclusions. • apply knowledge in plant physiology, terroir science, microbiology, and sensory analysis to assess the quality of wine products, • contextualize wine market trends and design innovative wines in line with sustainability challenges, • develop critical awareness at the intersection of biotechnology and agronomy. • implement and analyze quality concepts considering regulations, costs, and environmental aspects, • monitor the production and processing of high-quality grapes, • master risk management in professional environments. • analyze and document specialized resources. • present results and innovative wine ideas both in written and oral form. • work effectively in international teams, managing time and team roles.					
Module content		The aim of this module is to shape a desirable wine in 2030. To do so : Students will harvest and follow the wine production in their hosting companies. The wine will then be analyzed organoleptically and chemically at UHA. The objective is to link aromas or wine characteristics with particular chemical signatures. MOVE students will then have a study trip in Toulouse (EI PURPAN) to meet students from this Institution and a group from Spain, which also have realized the same analyses on their side. Together during one week, they will blend those wines to shape an product corresponding the consumer expectations.					
Teaching and learning methods							
Workload (hours)	Workload in total	225 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture						
	Supervision						
	Laboratory						
	Challenge-based Learning						
	Field trip						
	Total					225	
Module exam	Exam type	Report and Poster					
	Determination of the module grade						
	Prerequisite for the award of credit points	Passing the final module examination					
	Weighting for overall grade	9 of 116 CP for Plan A					
Offer frequency		Annual, winter semester			Duration: 1 Semester		
Teaching Language		English					
Literature		Recommended by the lecturer					

330 Project VitiSmart 1

<table>
<tr><th colspan="3">330 Project VitiSmart 1</th><th colspan="3">3. Sem.</th><th>3 CP</th></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3">Institute</td><td colspan="4">UHA</td></tr>
<tr><td colspan="3">Usability of the module</td><td colspan="4">MSc Viticulture and Enology: Plan A</td></tr>
<tr><td colspan="3">Module coordinator</td><td colspan="4">Dr. Romain Pierron</td></tr>
<tr><td colspan="3">Lecturers</td><td colspan="4"></td></tr>
<tr><td colspan="3">Requirements</td><td colspan="4">Knowledge of modules 120, 220 and 240 is recommended</td></tr>
<tr><td colspan="3">Learning outcomes</td><td colspan="4">The students
• set up and execute a specialized project by defining the project type, planning, and using project management tools,
• characterize and enhance their skills and career project by taking on roles and responsibilities within a project team and responding to company situations,
• design sustainable and agro-ecological management strategies, meeting industry partner expectations through regulation, risk management, and forward-looking strategies.
• develop and implement national and international marketing strategies, including conducting technical and economic assessments,
• master economic management by creating management plans and financial tools,
• manage production quality for marketing purposes and apply national and international regulations.</td></tr>
<tr><td colspan="3">Module content</td><td colspan="4">The aim of this module is to improve or develop tools for precision viticulture.

Missions will be delivered from vine research institute (IFV, INRAe) or private companies to develop new tools for a sustainable viticulture.

In addition to precision viticulture we will have a special focus on valorization in this module. Students will have to develop a marketing strategy to sell those technologies.</td></tr>
<tr><td colspan="3">Teaching and learning methods</td><td colspan="4"></td></tr>
<tr><td rowspan="10">Workload (hours)</td><td colspan="2">Workload in total</td><td colspan="4">75 hours</td></tr>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Courses</td><td></td><td></td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td colspan="2">Lecture</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Supervision</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Challenge-based Learning</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Total</td><td></td><td></td><td></td><td></td><td>75</td></tr>
<tr><td rowspan="4">Module exam</td><td colspan="2">Exam type</td><td colspan="4"></td></tr>
<tr><td colspan="2">Determination of the module grade</td><td colspan="4"></td></tr>
<tr><td colspan="2">Prerequisite for the award of credit points</td><td colspan="4">Passing the final module examination</td></tr>
<tr><td colspan="2">Weighting for overall grade</td><td colspan="4">3 of 116 CP for Plan A</td></tr>
<tr><td colspan="3">Offer frequency</td><td colspan="3">Annual, winter semester</td><td colspan="2">Duration: 1 Semester</td></tr>
<tr><td colspan="3">Teaching Language</td><td colspan="4">English</td></tr>
<tr><td colspan="3">Literature</td><td colspan="4">Recommended by the lecturer</td></tr>
</table>

350 Lab Rotation 1

350 Lab Rotation 1					**3. Sem.**	**15 CP**
Institute		Weincampus Neustadt				
Usability of the module		MSc Viticulture and Enology: Plan B				
Module coordinator		Prof. Dr. Lena Keller				
Lecturers		All full-time lecturers				
Requirements		Practice contract with cooperation research institute				
Learning outcomes		The students • gain hands-on experience in conducting scientific research in a professional setting. • develop a research plan in consultation with experts in the field. • master methodologies pertinent to wine research. • compile and present research findings in a structured scientific report. • enhance their ability to communicate scientific information effectively. • develop critical thinking skills by addressing complex research questions. • apply problem-solving techniques to overcome research challenges. • integrate into a professional research environment, gaining valuable networking opportunities. • improve their ability to work independently and collaboratively in a research setting. • gain international research experience, broadening their cultural and scientific horizons. • describe global challenges and innovations in viticulture and enology.				
Module content		In the "Lab Rotation 1" module, students spend 8 weeks in a research institution (either domestically or abroad), gaining insights into research related to wine. They have five elective courses to choose from: • Plant Breeding • Mitigation Strategies for Climate Change • Health Related Topics • Analytical Methodologies • Consumer Research In consultation with the supervising institutions, students select an interesting research question from the given areas to work on. The results are presented in the form of a scientific report.				
Teaching and learning methods		Practice phase				
Workload (hours)	Workload in total	375 hours				
		Courses				
		Attendance hours	Preparation and follow-up work		Exam	Total
	Practice phase	316				
	Supervision					
	Laboratory					
	Exercise					
	Field trip					
	Total	316			59	375
Module exam	Exam type	Scientific Report				
	Determination of the module grade	100% Research Report				
	Prerequisite for the award of credit points	Passing the final module examination				
	Weighting for overall grade	15 of 125 CP for Plan B				
Offer frequency		Annual, winter semester			Duration: 1 Semester	
Teaching Language		English				
Literature		Recommended by the lecturer				

360 Lab Rotation 2

360 Lab Rotation 2						3. Sem.	15 CP
Institute		Weincampus Neustadt					
Usability of the module		MSc Viticulture and Enology: Plan B					
Module coordinator		Prof. Dr. Dominik Durner					
Lecturers		All full-time lecturers					
Requirements		Practice contract with cooperation research institute					
Learning outcomes		The students • gain hands-on experience in conducting scientific research in a professional setting. • develop a research plan in consultation with experts in the field. • master methodologies pertinent to wine research. • compile and present research findings in a structured scientific report. • enhance their ability to communicate scientific information effectively. • develop critical thinking skills by addressing complex research questions. • apply problem-solving techniques to overcome research challenges. • integrate into a professional research environment, gaining valuable networking opportunities. • improve their ability to work independently and collaboratively in a research setting. • gain international research experience, broadening their cultural and scientific horizons. • describe global challenges and innovations in viticulture and enology.					
Module content		In the "Lab Rotation 2" module, students spend 8 weeks in a research institution (either domestically or abroad), gaining insights into research related to wine. They have five elective courses to choose from: • Plant Breeding • Mitigation Strategies for Climate Change • Health Related Topics • Analytical Methodologies • Consumer Research In consultation with the supervising institutions, students select an interesting research question from the given areas to work on. The results are presented in the form of a scientific report.					
Teaching and learning methods		Practice phase					
Workload (hours)	Workload in total	375 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Practice phase	316					
	Supervision						
	Laboratory						
	Exercise						
	Field trip						
	Total	316			59	375	
Module exam	Exam type	Scientific Report					
	Determination of the module grade	100% Research Report					
	Prerequisite for the award of credit points	Passing the final module examination					
	Weighting for overall grade	15 of 125 CP for Plan B					
Offer frequency		Annual, winter semester			Duration: 1 Semester		
Teaching Language		English					
Literature		Recommended by the lecturer					

410 Master Thesis

410 Master Thesis						**4. Sem.**	**30 CP**
Institute / Faculty		Weincampus Neustadt					
Usability of the module		MSc Viticulture and Enology: Plan A, Plan B					
Module coordinator							
Lecturers		All full-time lecturers					
Participation requirements		50 CP in previous modules					
Learning outcomes		The students • organize scientific research independently and on their own responsibility. • are able to work on a problem using the methods of their subject area within a specified period of time. • carry out scientific work independently. • correctly assess their ability to manage themselves. • develop an independent, scientifically based judgment. • present their research results to a specialist audience. • defend the results within the framework of the respective field of research.					
Module content		The topics are agreed individually with the module coordinators and lecturers					
Teaching and learning methods		Development of a scientific research project (Thesis Proposal) as well as planning and implementation of all steps required for data collection and evaluation. Subsequent writing of the scientific research and the research results (Thesis) as well as scientific defense of the thesis in the form of a presentation with subsequent scientific discussion and specific questions about the research work and research field (Thesis Defense)					
Workload (hours)	Workload in total	750 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture						
	Seminar						
	Laboratory						
	Exercise						
	Field trip						
	Total					750	
Module exam	Exam type	Thesis Proposal, Thesis, Thesis Defense					
	Determination of the module grade	Written first and second assessment of Thesis Proposal (25%) Written first and second assessment of Thesis (50%) Grading of Thesis Defense (25%)					
	Prerequisite for the award of credit points	Passing the final module examination					
	Weighting for overall grade	60 of 116 CP for Plan A, 60 of 125 CP for Plan B					
Offer frequency		Annual			Duration: 1 semester		
Teaching Language		English, German, French					
Literature		Recommended by the lecturer					

420 Project GreeneVine

420 Project GreeneVine						4. Sem.	6 CP
Institute		UHA					
Usability of the module		MSc Viticulture and Enology: Plan A					
Module coordinator		Dr. Romain Pierron					
Lecturers							
Requirements		Knowledge of module 120 is recommended					
Learning outcomes		The students • propose and implement an agro-ecological trial for sustainable viticulture, understanding project stakeholders' expectations, • analyze ecological factors and ecosystem functionality to propose innovative agronomic and technical approaches, • conduct an environmental diagnosis to assess production systems and suggest resilient and sustainable solutions. • identify, select, and critically analyze specialized resources to prepare a study report in the form of a scientific article, • create and present a poster in English, • communicate effectively in writing and speaking, present work results, and manage time and team roles efficiently. • conduct innovative experiments to develop strategies for high-quality production aligned with company strategy, • ensure production and marketing comply with legal regulations, conduct market research, and adhere to professional ethics, • connect with industry stakeholders, propose experimental strategies, and focus on sustainable development and CSR.					
Module content		The aim of this module is to shape the vineyard of the future. Students will be involved in a participative research project with vinedressers aiming at improving or developing plant protection in organic systems. Based on the interactions with vinedressers, fields will be instrumentalized to conduct an applied research in the field of agroecology.					
Teaching and learning methods							
Workload (hours)	Workload in total	150 hours					
		Courses					
		Attendance hours	Preparation and follow-up work		Exam	Total	
	Lecture						
	Supervision						
	Laboratory						
	Challenge-based Learning						
	Field trip						
	Total					150	
Module exam	Exam type	Poster Presentation					
	Determination of the module grade						
	Prerequisite for the award of credit points	Passing the final module examination					
	Weighting for overall grade	6 of 116 CP for Plan A					
Offer frequency		Annual, summer semester			Duration: 1 Semester		
Teaching Language		English					
Literature		Recommended by the lecturer					

430 Project VitiSmart 2

<table>
<tr><th colspan="6">430 Project VitiSmart 2</th><th>4. Sem.</th><th>3 CP</th></tr>
<tr><td colspan="2"></td><td colspan="6"></td></tr>
<tr><td colspan="2">Institute</td><td colspan="6">UHA</td></tr>
<tr><td colspan="2">Usability of the module</td><td colspan="6">MSc Viticulture and Enology: Plan A</td></tr>
<tr><td colspan="2">Module coordinator</td><td colspan="6">Dr. Romain Pierron</td></tr>
<tr><td colspan="2">Lecturers</td><td colspan="6"></td></tr>
<tr><td colspan="2">Requirements</td><td colspan="6">Knowledge of module 120, 220 and 240 is recommended, VitiSmart 1</td></tr>
<tr><td colspan="2">Learning outcomes</td><td colspan="6">The students
• set up and execute a specialized project by defining the project type, planning, and using project management tools,
• characterize and enhance their skills and career project by taking on roles and responsibilities within a project team and responding to company situations,
• design sustainable and agro-ecological management strategies, meeting industry partner expectations through regulation, risk management, and forward-looking strategies.
• develop and implement national and international marketing strategies, including conducting technical and economic assessments,
• master economic management by creating management plans and financial tools,
• manage production quality for marketing purposes and apply national and international regulations.</td></tr>
<tr><td colspan="2">Module content</td><td colspan="6">The aim of this module is to improve or develop tools for precision viticulture.

Missions will be delivered from vine research institute (IFV, INRAe) or private companies to develop new tools for a sustainable viticulture.

In addition to precision viticulture we will have a special focus on valorization in this module. Students will have to develop a marketing strategy to sell those technologies.</td></tr>
<tr><td colspan="2">Teaching and learning methods</td><td colspan="6"></td></tr>
<tr><td rowspan="10">Workload (hours)</td><td>Workload in total</td><td colspan="6">75 hours</td></tr>
<tr><td rowspan="2"></td><td colspan="5">Courses</td><td></td></tr>
<tr><td>Attendance hours</td><td>Preparation and follow-up work</td><td></td><td>Exam</td><td>Total</td></tr>
<tr><td>Lecture</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Supervision</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Laboratory</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Challenge-based Learning</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Field trip</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td></td><td></td><td>75</td></tr>
<tr><td rowspan="4">Module exam</td><td>Exam type</td><td colspan="6"></td></tr>
<tr><td>Determination of the module grade</td><td colspan="6"></td></tr>
<tr><td>Prerequisite for the award of credit points</td><td colspan="6">Passing the final module examination</td></tr>
<tr><td>Weighting for overall grade</td><td colspan="6">3 of 116 CP for Plan A</td></tr>
<tr><td colspan="2">Offer frequency</td><td colspan="4">Annual, summer semester</td><td colspan="2">Duration: 1 Semester</td></tr>
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<tr><td colspan="2">Literature</td><td colspan="6">Recommended by the lecturer</td></tr>
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