TECHNOLOGICAL EDUCATIONAL INSTITUTE OF ATHENS

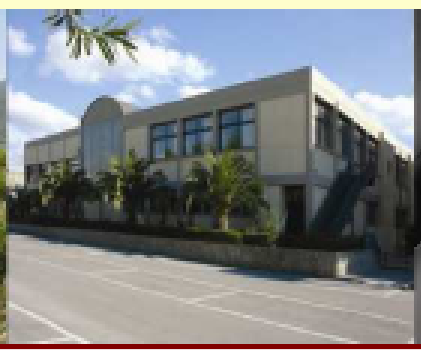
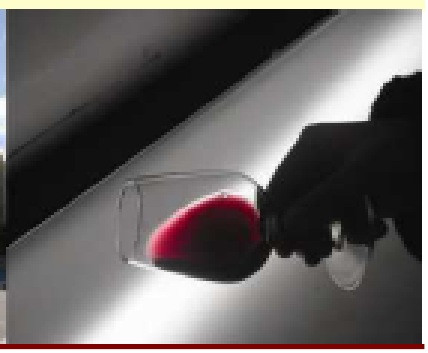
FACULTY OF FOOD TECHNOLOGY & NUTRITION

DEPARTMENT
OF OENOLOGY
& BEVERAGE
TECHNOLOGY

25 YEARS
1985-2010

CURRICULUM STUDIES GUIDE

ACADEMIC YEAR 2010-2011

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1 HISTORY OF THE DEPARTMENT

In Greece the provision of a comprehensive higher education course exclusively devoted to oenology has been a standing request of the wine industry since 1983, when the Technological Educational Institutes were first established. At that time a few courses in oenology or viticulture were taught at University Agricultural Faculties, in the Faculties of Food Technology of the TEI Institutes in Athens and Thessaloniki (oenology courses only) and at the Agricultural Technology Faculties of the TEI Institutes (viticulture courses only).

The industry's request was taken up by the Council for Technological Education (STE), a national body in which Ministries with related areas of responsibility, Universities, Technological Educational Institutes, social institutions and political parties, all participate. The STE Council made a recommendation to the Minister of Education regarding the establishment of a Department of Oenology and Beverage Technology at the Technological Educational Institute of Athens. This recommendation was realized with the issue of a Presidential Decree in 1985, by means of which the Department of Oenology and Beverage Technology was established at the Athens TEI Institute.

The Department of Oenology and Beverage Technology curriculum filled the gap which had existed until that time in Greece in relation to provision of comprehensive tertiary education in oenology, with a duration of 4 years.

The establishment of the profession of the oenologist for graduates of the Department of Oenology and Beverage Technology is laid down by law no. 1967/1987 (Government Gazette 57, issue A'), on the "regulation of matters pertaining to supervision of legal entities by the Ministry of Agriculture and other provisions". This law was passed when the new Department of Oenology and Beverage Technology began operating.

In accordance with Presidential Decree (342/28-9-2001), published after the incorporation of the TEI Institutes as upper level tertiary education institutions, the outline of the range of studies for graduates of the Department of Oenology and Beverage Technology graduate was determined.

The certificate of studies granted by the Department of Oenology and Beverage Technology of the Athens TEI Institute is a basic certificate of studies in higher education, equivalent to that granted by both Universities and other TEI Institutes. It is a degree level certificate and in all formal texts written in a language other than Greek is referred as "Ptychio". The Department of Oenology and Beverage Technology, together with the Department of Food Technology, belongs to the Faculty of Food Technology and Nutrition of the Athens TEI Institute. It is the only Department of Higher Education in Greece which, for 25 years now, has offered a fully integrated education

in oenology and viticulture, with a four-year duration. In its curriculum development the Department follows the principles established by the International Organization of Vine and Wine (OIV), as well as the curriculums of corresponding University Departments worldwide. Since 1992 the Department has been an active member of the International University Association for Wine and Vine Products (AUIV), which operates under the aegis of the OIV.

Similar Oenology Departments also exist in the USA, in Canada, Australia, New Zealand, South Africa and in many EU countries, including France, Italy, Spain, Portugal and Germany. During the ERASMUS Interuniversity Cooperation Program - ICP (1989-1997), the Department, under the guidance of the late Professor Ioannis Kazazis who acted as inter-European Coordinator, was responsible for the coordination of interuniversity cooperation between the primary Oenology Departments in higher education in Europe (ERASMUS ICP in Oenology). The University of Burgundy (Dijon), the University of Champagne-Ardenne (Reims) and the University of Bordeaux (France) participated in the cooperation program, as well as the Universities of Cordoba and Catalonia (Barcelona) in Spain, the Universities of Torino and Udine in Italy, the University Tras-os-Montes e Alto Douro in Portugal and the Fachhochschule Wiesbaden (Geisenheim) in Germany. Through this program the Department of Oenology and Beverage Technology coordinated inter-university cooperation on curriculums, organized educational exchanges of students and Professors between the Institutes and also coordinated the organization of a postgraduate cooperation program for the Institutes participating in the network.

The Department has also developed cooperation with the Université d'Orléans and in particular, with the University's Department of Chemistry, for the purpose of student exchange for postgraduate research programs.

At the same time, the Department organized a broad program including other educational collaborations at a European and international level, which have been developed and transformed into new forms of collaboration, mainly relating to postgraduate programs of studies and participation in intensive inter-university study programs of limited duration.

Since its inception studies in the Department of Oenology and Beverage Technology involve eight (8) semesters, the completion of a compulsory Dissertation, as well as supervised and guided Practical Training in the profession. The latter is carried out in workspaces concerned with oenology applications (wine industries, beverage industries, agricultural associations, oenology analysis and process laboratories, companies providing oenology equipment, research centers, Higher Education laboratories, public sector institutions etc.).

The number of students admitted to the Department of Oenology and Beverage Technology is determined by means of a relevant ministerial decision and until the academic year 2009-2010 intake was equally distributed over the two semesters, winter and spring. From the academic year 2010-11 onwards students are only admitted only in the winter semester, following normal university admission practice. The number of students registered in the Department in the spring semester 2009-2010 reached 538 (55.4% male and 44.6% female).

From the date of its inception until December 2010, a total of 730 students have graduated from the Department. The majority of graduates are occupied in fields related to the wine sector, generally in the production process or wine and beverage sales and marketing. A certain percentage of graduates (master's or doctoral graduates) are engaged in research as teaching/research staff in research centers and educational institutes in Greece and abroad.

The Department's facilities are located in the Athens TEI Institute (Technological Educational Institute of Athens) in Egaleo, Postal Address: Ag. Spiridonos, 12210 Egaleo.

Matters pertaining to student welfare are described in detail on the Athens TEI webpage: **www.teiath.gr.**

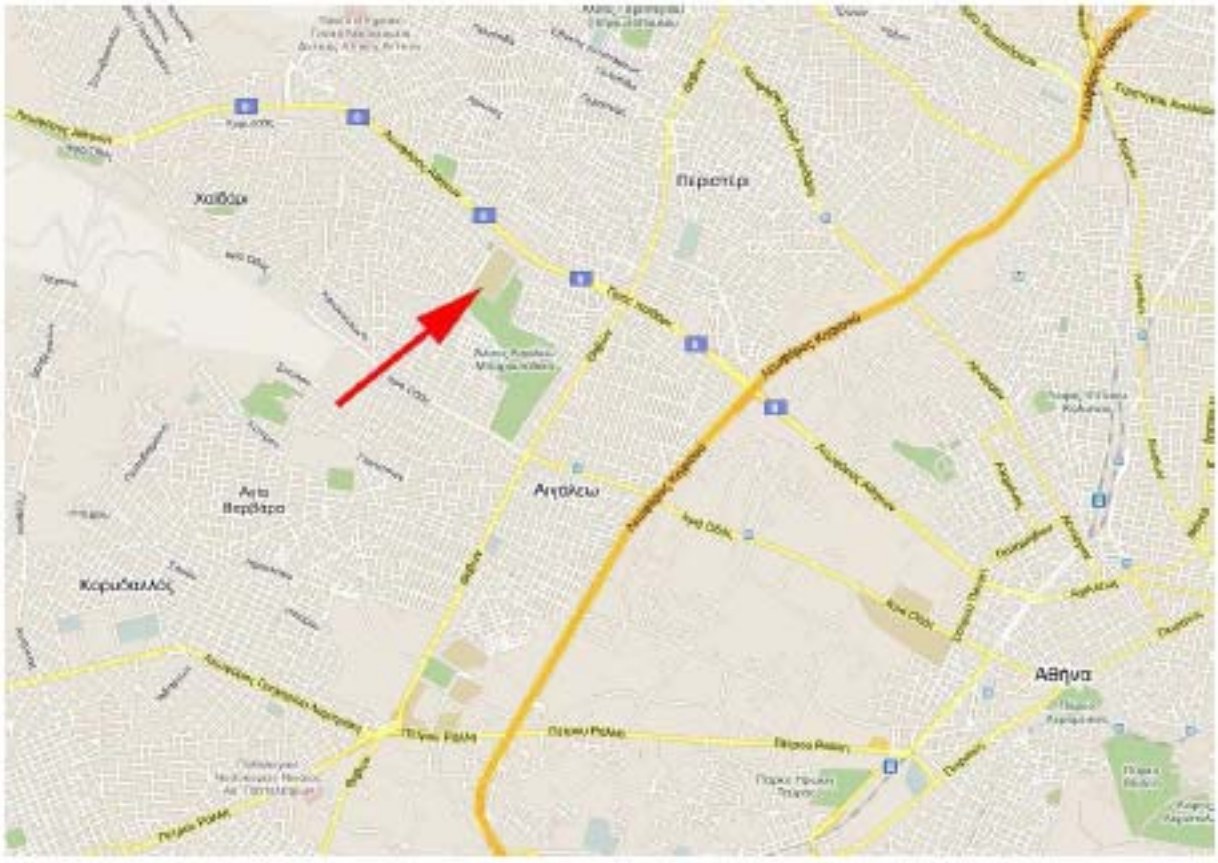


Image 1.1 Site of the Athens Technological Educational Institute in Attica

Image 1.2 The Department of Oenology & Beverage Technology at the Athens TEI Institute

2 DEPARTMENTAL CONTENT OF STUDIES

In accordance with Presidential Decree (342/28-9-2001), which was published after the incorporation of the TEI Institutes in higher education, the specifications for graduates of the Department of Oenology and Beverage Technology were defined, determining the range of educational subjects to be covered.

The Department of Oenology and Beverage Technology study content covers the disciplinary field of applied life and natural sciences to the following sectors: production and treatment of grapes and other agricultural raw materials which may undergo fermentation or other processes for the production of wines and beverages, treatment and utilization of agricultural products and by-products by agricultural industries for the production of raw materials for beverage manufacture and new products, and water treatment.

The Department's mission is to promote the development and dissemination of knowledge in wine and beverage technology and sciences by means of teaching and research. It also aims to provide students with the necessary skills for proper preparation for their scientific and professional careers and future progress.

On completion of their studies, Department graduates will have acquired the necessary scientific and technological knowledge, abilities and skills in order to work as Oenologists and Beverage Technologists, particularly in the following areas:

- Production, treatment, quality assurance, quality and suitability certification and quality control of wine-growing products, beverages and water.
- Packaging, storage, maintenance, distribution and commercial trading of wines, beverages and water.
- Planning of wine-growing, brewing and beverage businesses.
- Establishment and running of wine and spirits tasting laboratories, laboratories for beverage analysis, as well as laboratories for the control of wine waste products and water.
- Planning and implementation of research and development programs, as well as preparation of financial & technical studies in the fields of oenology and beverage & water technology.
- Provision of technical support on issues related to the environmental and legal obligations of wine and beverage companies at a national and international level.
- Preparation of studies and design of industrial production facilities for wine, beer and beverages.
- Within the context of joint projects with other experts or individually, the preparation of studies and design of industrial production facilities for wine, beer and beverages; establishment and cultivation

of vineyards and other cultivations used in beverage production, the utilization of their by-products and treatment of waste from industrial production of wine and beverages.

The duration of the study program is eight (8) semesters. The first seven (7) semesters are comprised of theory courses, practical laboratory exercises, seminars and visits to production sites, as well as preparation of essays with an emphasis on case studies and group work. Particular emphasis is placed on the development of the students' personal skills, including the development of initiative and problem solving skills. From the 7th semester and thereafter, students carry out six months of practical training in industrial and commercial enterprises engaged in the field of wines and beverages, in state monitoring institutions, research centers etc. From the 7th semester and thereafter, students also work on their dissertation.

The curriculum is structured on the basis of student workload (WL) (750 hours per semester).

The Department's courses of general structure include, among others, the following courses: Mathematics, Chemistry, Physics, Plant Biology, Microbiology and Biochemistry.

By means of the specialization courses students obtain knowledge in the chemical composition of wines and beverages, their biological and biochemical behavior, the nature and behavior of enzymes, the microbiology of wines, processes and storage conditions, as well as use of statistics in the planning of experimental work and evaluation of results.

Management, economics and legal fields of study constitute a special category of course, which are vital to the organization and management of businesses, laboratories, organizations and services relating to the specialty. Disciplinary fields in the humanities are also part of the same special course category.

Professional prerogatives of Department of Oenology & Beverage Technology Graduates

The subject field and curriculum of the Athens TEI Department of Oenology and Beverage Technology have been drawn up in accordance with decisions 2/1991, 2/1992 and 7/1976 (and more than covers the requirements) of the International Organization of Vine and Wine **(Organisation Internationale de la Vigne et du Vin - OIV)** in which Greece participates as a full member.

In accordance with the latest Presidential Decree under Greek legislation, number 342/2001 (Government Gazette A' 230/11/10/2001) **"Determination of the content of studies of the Departments of a) Nutrition, b) Food Technology, c) Oenology and Beverage Technology of the Faculty of Food Technology and Nutrition of the Technological Educational Institutes" (**Paragraph C):

C. Department of Oenology and Beverage Technology of the Athens TEI Institute

The content of studies of the Department of Oenology and Beverage Technology of the Athens TEI Faculty of Food Technology and Nutrition covers the field of study relating to applied life and natural sciences in the treatment of grapes and other agricultural raw materials which may undergo alcoholic fermentation, as well as of the distillation products of these yeasts for the production of beverages.

On completion of their studies, Department graduates will have acquired the necessary scientific and technological knowledge in order to work as Oenologists and Beverage Technologists, particularly in the following areas:

1. Production, treatment, quality control and assurance, quality and suitability certification of the wine-growing, brewing and distillation products, as well as of other beverages.
2. Packaging, storage, maintenance, distribution and commercial trading of wines, beverages and water.
3. Planning of wine-growing, brewing and beverages businesses.
4. Establishment and operation of oenological tasting laboratories, beverages analysis laboratories, as well as laboratories for the control of wine waste products and water.
5. Planning and implementation of research and development programs, as well as preparation of financial & technical studies in any oenology and beverage technology field.
6. Provision of technical Support on issues related to the environmental and legal obligations of wine and beverages companies at a national and international level.
7. Preparation of studies and design of industrial production facilities for wine, beer and beverages.

8. Within the context of collective group projects with other experts, the establishment and cultivation of vineyards, utilization of their by-products and treatment of waste from industrial production of wine and beverages.

The content of studies is comprised of theory courses, laboratory exercises, tutorials, seminars, visits to production sites and preparation of essays with an emphasis on case studies and group work. Particular emphasis is placed on the development of the students' personal skills, including the development of initiative taking and problem solving skills.

The main subject fields of studies in the Department are comprise of courses of general structure in physical and life sciences, such as chemistry, microbiology, biochemistry, physical chemistry, biotechnology, as well as vine-based fields of studies, such as morphology and physiology, soil science and special issues in viticulture.

The specialization fields of study are comprised of science, technology and quality control of wines and beverages, among others.

Management, economics and legal fields of study constitute a special category of course, which are vital to the organization and management of businesses, laboratories, organizations and services relating to the specialty.

Upon the publication of the present document any other previous provisions related to the content of studies in the aforementioned Departments cease to apply.

Oenologists are defined under the law by the following:

Law 1697/1987, Government Gazette Issue no. 57, Article 4, Paragraph 3, article 9 of Legislative Decree 243/1969 (Government Gazette 144) is supplemented by paragraphs 9 and 10, which state the following:

9. From 1.1.1990 and thereafter, all provisions of Legislative Decree 243/1969 regarding the granting of an oenologist professional license are abolished.

10. From the date on which the above law becomes applicable, oenologists are considered to be:

a) Graduates of the Department of Oenology and Beverage Technology of TEI Institutes or of other foreign schools recognized as equivalent.

b) Graduates of institutes of higher education in Greece or abroad who, within their study curriculum, have taken courses in oenology lasting at least two semesters, in accordance with the decisions of the International Organization of Vine and Wine.

c) Graduates of the DIJON school and graduates of the school of higher education for Vegetative Food Technologists (Center of Higher Technical and Vocational Education) before 31.12.1986, who, however, are obliged to attend an oenology retraining course. The program, duration and any other procedure and details of the latter are determined by

joint decision of the Ministers of National Education and Religious Affairs and Agriculture.

The latest decision currently in force regarding the **Professional prerogatives of Department of Oenology and Beverage Technology graduates** is the **Decision of the Council of Technological Education N° 13/11-1-1994,** according to which:

1. Graduates of the Department of Oenology and Beverage Technology of the Faculty of Food Technology and Nutrition of Technological Educational Institutes, based on their specialized scientific and technical knowledge, engage either individually or in cooperation with other scientists in the study, research and implementation of technology and biotechnology in modern and specialized fields in oenology and beverage technology, as well as in the process of maintenance, treatment and quality control, utilization of their by-products and biological waste treatment.
2. The aforementioned graduates are considered to be oenologists, according to the provisions of article 4, Law 1697/1987, and may be employed either as unit executive staff or self-employed, engaged in the following subject fields and activities:
   a. Production and quality control of wines and beverages in corresponding types of industrial and small industrial firms as production managers of such units or as quality control managers or department managers.
   b. Sales and distribution of equipment for industrial and small industrial firms concerned with production of wine and beverages.
   c. Sales and distribution of supplementary materials used in industrial and small industrial firms concerned with production of wine and beverages.
   d. Establishment and operation of oenology laboratories, as well as beverage analysis and control laboratories in accordance with legislation currently in force.
   e. Execution and supervision of project design studies or participation in technical and financial feasibility studies and supervision thereof for the establishment or expansion of industrial and small industrial firms in the wine and beverage field, in accordance with legislation currently in force.
   f. Participation in the study and supervision of construction or expansion of industrial and small industrial firms in the wine and beverage field.
   g. They may practice any other activity emerging from developments in oenology and beverage technology which proves to fall under the subject field of their specialty.

3. They may act as experts in market policing or other courts and control services concerned with quality and suitability certification of wines and beverages.
4. They may participate and collaborate in studies related to vineyard establishment and cultivation.
5. Graduates of the aforementioned department may be promoted within the entire spectrum of the administrative and technical hierarchy in wine and beverage industrial and small industrial firms, as well as in relevant services. They may also hold executive positions, as provided for by legislation currently in force, in the management of businesses concerned with the production process and exploitation of wines, beverages and related derivatives.
6. Graduates of the aforementioned department may be employed in education, in accordance with current legislation. They may also work as members of research teams in subjects of their specialization.
7. On obtaining their degree, graduates of the Department of Oenology and Beverage Technology of the Faculty of Food Technology and Nutrition of the Technological Educational Institutes practice their profession within the framework of the aforementioned professional prerogatives and in accordance with current legislation.

Oenologists have the right to **Establish and run an oenology laboratory.** License for the establishment and running of an oenology laboratory is granted according to the provisions of **royal decree 641/30.9.1970 (Government Gazette 217/A/15.10.70)** and in accordance with presidential decree 243/1969 (Government Gazette 144/A/25.7.69) as supplemented by Law 427/1976 (Government Gazette 230/A/31.8.1976) and in particular, in accordance with article 7 as modified by Law 1697/1987 (Government Gazette 57/A/28.4.87), Article 4, Paragraph 3), which abolishes the oenologist professional license and its provisions, and in accordance with the presidential decree 332/1983 (Government Gazette 119/A/8.11.83) on the delegation of responsibilities to Prefects. The authorities competent for the granting of licenses are the Directorates of Agriculture of the Prefectures.

Oenologists as Experts

According to decision no. 457/98 of the State Legal Council, approved by the State Secretary of the Ministry of Finance, Mr. G. Dris, on 3.09.98, it is pointed out that:

"… graduates of the Department of Oenology and Beverage Technology of the TEI Faculty of Food Technology and Nutrition **are entitled to be present in beverage sample testing under appeal undertaken by the General Chemical Laboratory and before the Supreme Chemical Council of the State".**

Oenologists as Safety Technicians

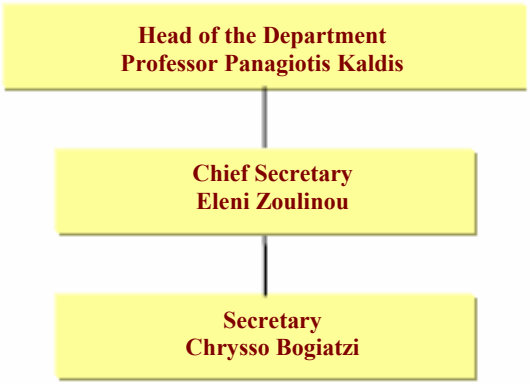
Graduates of the Department of Oenology & Beverage Technology may be employed as Safety Technicians in the wine & beverages industry in accordance with P.D. 294/1988. Minimum time-period of employment for security technicians and occupational physicians, level of knowledge and specialty of safety technician for businesses, operations and activities is determined by article 1, paragraph 1 of Law 1568/1985 on the "Hygiene and safety of employees" (Government Gazette138/A/21-6-1988)

For businesses occupying less than 50 employees, the above P.D. is supplemented by the provisions of par. 2 and 3, article 4 of P.D. 17/96 (Government Gazette 11/A/960) "Measures for improving the safety and health of employees at work in compliance with directives 89/391/EEC and 91/383/EEC"

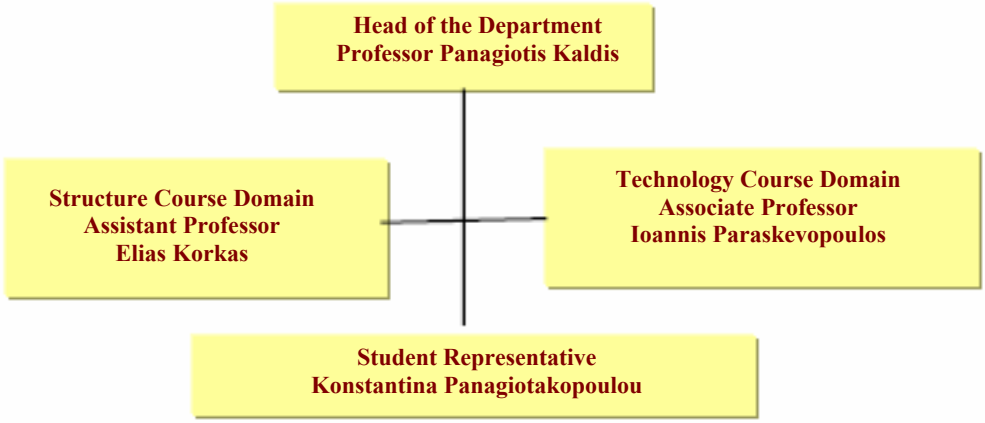
The qualifications of Safety Technicians (diplomas, training, education, experience) are determined by Law 1568/1985 – Health and Safety of Workers - (Government Gazette 177/A/18-10-85) and its amendments.

3 ORGANIZATION – ADMINISTRATION OF THE DEPARTMENT

A. Head and Secretariat of the Department



B. Department Council



C. General Assembly of the Department

The **Department General Assembly** is convened by all the members of the Teaching Staff and by student representatives equivalent to 40%.

The **Department Council** is constituted by the Head, the Domain Supervisors and one (1) student representative.

The **General Assemblies of Course Domains** are convened by the permanent Teaching Staff belonging to the Domain and by two (2) student representatives. The Department is divided into two Course Domains: a) the Structure Course Domain and b) the Technology Course Domain. Each Domain corresponds to specific scientific and technological fields. The administrative organs of the Domain are the Domain General Assembly and the Domain Supervisor.

Head of Department: Directs the running of the Department and presides over the Department's General Assembly and Council.

4. DEPARTMENT STAFF

4.1 Teaching Staff

The Department of Oenology & Beverage Technology has 12 permanent members of Teaching Staff:

Academic level	Specialization	Appointed Disciplinary Field
Professors		
Panagiotis Kaldis	Agriculturist, Ph.D. in Applied Economics	Applied Economics with an emphasis on Wine Sector Marketing
Elias Neratzis	Biologist, Ph.D. in Biology	Biotechnology
Vassilios Dourtoglou	Chemist, Ph.D. in Chemistry	Organic Chemistry – Natural Products - Biochemistry
Associate Professors		
Ioannis Paraskevopoulos	Agriculturist, Ph.D. in Oenology	Technology of Wine Products
Argyrios Tsakiris	Chemist, Ph.D. in Chemistry	Technology and Quality Control of Distillates
Assistant Professors		
Katerina Kapsopoulou	Biologist, Ph.D. in Microbiology	Microbiology & Enzymology of Wines
Elias Korkas	Agriculturist, Ph.D. in Viticulture	Ampelography - Viticulture
Spyridon Papaconstantinou	Chemist, Ph.D. in Pollution Engineering	Study & Design of Wine - Beer – Beverage Industries and Waste Treatment
Lecturers		
Philippos Acarepis	Chemist, Ph.D. in Oenology	Technology and Quality Control of Wines
George Banilas	Biologist, Ph.D. in Biology	Biologist specializing in grape vine Morphology-Physiology
Thalia Dourtoglou	Chemist, Ph.D. in Chemistry	Chemist specializing in Wine Chemistry & Biochemistry
Panagiotis Tataridis	Oenologist, Ph.D. in Process & Environmental Engineering	Technologist - Oenologist specializing in Winemaking Process Engineering

- Coordinates and guides research programs funded by other bodies outside the Department, particularly by the European Union.
- They develop international cooperations as part of research programs and other academic activities.
- They are reviewers of scientific papers for internationally renowned journals in the field.
- They participate in editorial advisory boards of journals in the field.
- Their research results have been acknowledged and internationally recognized.
- They have made proposals on research policy issues in their field.
- They have participated in International Conferences and have received awards.

4.2 Special Technical Staff

The Department of Oenology & Beverage Technology has 5 members of Special Technical Staff:

Anastasopoulou Stavroula, Graduate of the Medical Laboratories Department Laboratories: Biotechnology, Biochemistry and Microbiology

Vassilios Nicolou, Graduate in Chemistry and Food Technology (Oenologist) Laboratories: Instrumental Chemical Analysis, Physical chemistry and Basic Winemaking Techniques

Ekaterini Xirogianni, Graduate of the Biochemical Laboratories Assistants Department of the Pedagogical Technical School (PATES)
Laboratories: Wine Technology, Sensory Evaluation and Waste Treatment

Theodora Panoriou, Graduate of the Chemistry Supervisory Staff Department of the Pedagogical Technical School (PATES)
Laboratories: Plant Biology, Morphology & Physiology of Vine, Quantitative Chemical Analysis and Soil-Climate System & the Vine

Aikaterini Saxioni, Graduate of the Chemistry Supervisory Staff Department of the Pedagogical Technical School (PATES)
Laboratories: Wine and Must Composition Analysis, Raw Materials of Alcoholic Beverages and Technology & Analysis of Musts & Wines

5 DEPARTMENT FACILITIES

The Department has a classroom for the teaching of theoretical courses D_2 (~30m^2) on the 1st floor of the Faculty of Food Technology and Nutrition as well as a classroom P_1 (~15m^2) in the prefabricated building of the Nursing Department. In addition, there is a special room (~30m^2) equipped with 18 PCs connected to the T.E.I. intranet, for teaching of the course "Applied Informatics". The Department has the following laboratory facilities:

- Biochemistry/Biotechnology Laboratory: 90m^2
- Alcoholic Beverages Technology and Soil Science Laboratory: 60m^2
- Technical Laboratory for "BASIC WINEMAKING TECHNIQUES": 60m^2
- Technical Laboratory for "SPECIAL WINEMAKING TECHNIQUES": 60m^2
- Organoleptic Testing and Packaging Laboratory: 60M^2
- Experimental Winery: 250m^2
- Multipurpose Research Laboratory: 25m^2
- Laboratory for the analysis of volatile compounds and study of wine composition.
- Seminar Room.
- Experimental vineyard with 38 Greek and foreign varieties.

6 RESEARCH ACTIVITIES – SEMINARS - WORKSHOPS

Despite the short space of time which has elapsed since the Department began operation and the absence, until today, of institutionalized, independent postgraduate studies, the Department has been active from its inception, undertaking research initiatives in the fields of oenology, viticulture, beverage technology, biotechnology and industrial fermentations.

The Department has been involved in all major European educational programs (COMETT, TEMPUS, ERASMUS, SOCRATES, LEONARDO, MUNDUS), with extremely positive results. The activities developed so far, and which are still in progress involve:

- Student exchanges,
- Teaching Staff exchanges,
- Development of intensive courses or participation in them,
- Organization of Workshops and Seminars.

Through the above-mentioned programs, the Department has managed to establish connections with dozens of similar Departments in: England, France, Germany, Netherlands, Belgium, Spain, Portugal, Ireland, Hungary, Poland Bulgaria, Russia, Czech Republic etc. With the aim of pursuing further expansion and more active cooperation with Institutions abroad, the Department intends to provide teaching of certain courses in English as well.

Intergovernmental cooperation has been established between the Department and the Université d'Orléans in France.

With regard to the area of training seminars, the Department organizes special oenological training seminars or further training for University, T.E.I. and higher education graduates. Furthermore, the Department participates in workshops, international conferences and industry sector exhibitions.

7 CURRICULUM

The last revision of the Curriculum took place during the academic year 2008-2009 and the new Curriculum is in force from the winter semester of the academic year 2009/2010. The revision was aimed at ensuring continued innovation in educational and research practices within the complex and interdependent fields of Wines and Beverages at the regional, national and international level. Within this context, changes and interventions were made and important alterations were initiated in order to harmonize the Curriculum, as far as possible, with the curriculums of other similar Departments in EU countries. The curriculum committee (C.C.) monitors the implementation of the new curriculum and proposes amendments to Department Council for consideration in future revisions.

The Curriculum was approved and published according to the Internal Operating Regulations of the T.E.I. of Athens.

The undergraduate curriculum of the Department includes:

- Courses of General Structure (CGS): 10
- Courses of Special Structure (CSS): 12
- Specialization Courses (SC): 14
- Courses MELH: 4
- Total courses:.....40

Of the above-mentioned courses, **36 are compulsory** and **4 elective-compulsory**. The selection of the 4 courses is made from a total of 8 courses (5 SC and 3 MELH).

Courses of General Structure (CGS)

1. GENERAL AND INORGANIC CHEMISTRY
2. APPLIED MATHEMATICS AND STATISTICS
3. APPLIED INFORMATICS
4. PHYSICS
5. PLANT BIOLOGY
6. ORGANIC CHEMISTRY
7. QUANTITATIVE CHEMICAL ANALYSIS
8. PHYSICAL CHEMISTRY
9. GENERAL MICROBIOLOGY
10. BIOCHEMISTRY

Courses of Special Structure (CSS)

11. INTRODUCTION TO WINE AND BEVERAGE TECHNOLOGY
12. MORPHOLOGY & PHYSIOLOGY OF THE VINE
13. SOIL-CLIMATE SYSTEMS & THE VINE
14. RAW MATERIALS OF ALCOHOLIC BEVERAGES
15. PHYSICAL PROCESSES
16. WINE MICROBIOLOGY
17. BIOTECHNOLOGY & INDUSTRIAL FERMENTATIONS
18. VINE CULTURE
19. QUALITY MANAGEMENT
20. INSTRUMENTAL CHEMICAL ANALYSIS
21. VINE PLANT PROTECTION
22. AMPELOGRAPHY

Specialization Courses (SC)

23. WINE & MUST COMPOSITION & ANALYSIS
24. BASIC WINEMAKING TECHNIQUES/TECHNOLOGIES
25. SPECIAL WINEMAKING TECHNIQUES/TECHNOLOGIES
26. TECHNOLOGY & ANALYSIS OF DISTILLATES
27. PHYSICO-CHEMICAL CHANGES & TREATMENTS OF WINE

28. WASTE TREATMENT
29. AROMATIC SUBSTANCES OF WINES
30. ENGLISH/FRENCH FOR SPECIFIC PURPOSES
31. TECHNOLOGY OF MALTING AND BREWING
32. SENSORY EVALUATION OF WINE AND BEVERAGES

Courses (MELH)

33. PRINCIPLES OF FINANCIAL SCIENCE
34. BUSINESS ADMINISTRATION
35. MARKETING OF WINE & BEVERAGES
36. WINE & BEVERAGES LEGISLATION

Elective Compulsory (4 out of 8 are selected)

1. PACKAGING OF WINE AND BEVERAGES
2. WINE-TOURISM MANAGEMENT
3. APPLIED ENZYMOLOGY
4. TECHNOLOGIES FOR USE OF BY-PRODUCTS
5. SALES TECHNIQUES FOR WINE AND BEVERAGES
6. SEMINAR & ESSAY PRESENTATION TECHNIQUES
7. PROFESSIONAL ETHICS
8. DESIGN OF INDUSTRIES

All courses are taught over a period of 13 full weeks per semester. The ratio of theoretical to laboratory courses is 59% / 41%. From the 7th semester onwards, students work on their dissertation, while in order to graduate, they are also required to complete their practical training.

7.1 Course Curriculum by Semester

A/A	A' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
TO-11 I	General and Inorganic Chemistry	CGS	4	3	7	225	8.0
TO-12 I	Applied Mathematics and Statistics	CGS	3	-	3	135	5.0
TO-13 I	Applied Informatics	CGS	2	2	4	120	4.0
TO-14 (	Physics	CGS	2	2	4	120	4.0
TO-15 I	Introduction to Wine and Beverage Technology	CSS	2	-	2	90	3.5
TO-16 I	Plant Biology	CGS	3	2	5	165	5.5
6 courses	**TOTAL WEEKLY HOURS**		**16**	**9**	**25**	**885**	**30**

A/A	B' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
TO-21	Organic Chemistry	CGS	3	3	6	180	7.5
TO-22	Quantitative Chemical Analysis	CGS	2	3	5	135	5.5
TO-23	Physical Chemistry	CGS	2	3	5	135	5.5
TO-24	General Microbiology	CGS	3	3	6	180	7.5
TO-25	Morphology & Physiology of Vine	CSS	2	2	4	120	4.0
5 courses	**TOTAL WEEKLY HOURS**		**12**	**14**	**26**	**750**	**30**

A/A	C' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
TO-31	Biochemistry	CGS	2	3	5	135	5.5
TO-32	Soil-Climate Systems & the Vine	CSS	2	2	4	120	4.5
TO-33	Raw Materials of Alcoholic Beverages	CSS	2	2	4	120	4.5
TO-34	Physical Processes	CSS	3	2	5	165	6.5
TO-35	Wine & Must Composition and Analysis	SC	2	4	6	150	5.5
TO-36	Principles of Financial Science	MELH	2	-	2	90	3.5
6 courses	**TOTAL WEEKLY HOURS**		**13**	**13**	**26**	**780**	**30**

A/A	D' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
T0-41	Wine Microbiology	CSS	3	3	6	180	7.0
TO-42	Biotechnology & Industrial Fermentations	CSS	3	3	6	180	7.0
TO-43	Vine Culture	CSS	2	2	4	120	4.5
TO-44	Basic Winemaking Techniques/Technologies	SC	3	2	5	165	6.5
T0-45	Quality Management	CSS	3	-	3	135	5.0
5 courses	**TOTAL WEEKLY HOURS**		**14**	**10**	**24**	**780**	**30**

A/A	E' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
TO-51	Instrumental Chemical Analysis	CSS	3	3	6	180	6.5
T0-52	Special Winemaking Techniques/Technologies	SC	3	2	5	165	6.0
TO-53	Vine Plant Protection	CSS	3	2	5	165	6.0
TO-54	Ampelography	CSS	3	2	5	165	5.5
TO-55	Technology & Analysis of Distillates	SC	3	2	5	165	6.0
5 courses	**TOTAL WEEKLY HOURS**		**12**	**11**	**23**	**840**	**30**

A/A	F' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
TO-61	Business Administration	MELH	3	-	3	135	4.0
TO-62	Physico-chemical Changes and Treatments of Wine	SC	3	3	6	180	6.5
TO-63	Waste Treatment	SC	2	2	4	120	4.0
TO-64	Aromatic Substances of Wine	SC	2	-	2	90	3.0
TO-65	English/French for Specific Purposes	SC	4	-	4	180	6.5
TO-EY	Selection 1 (see following Table)	SC	2	-	2	90	3.0
TO- EY	Selection 2 (see following Table)	SC	2	-	2	90	3.0
7 courses	**TOTAL WEEKLY HOURS**		**18**	**5**	**23**	**885**	**30**

A/A	G' Semester Courses	Category	TH	LAB	Total	Work Load	Credits
TO-71	Technology of Malting and Brewing	SC	3	5	8	210	8.0
TO-72	Marketing of Wine & Beverages	MELH	3	-	3	135	5.0
TO-73	Wine & Beverages Legislation	MELH	2	-	2	90	3.5
TO-74	Sensory Evaluation of Wines and Beverages	SC	3	3	6	180	6.5
TO- EY	Selection 3 (see following Table)	SC	2	-	2	90	3.5
TO- EY	Selection 4 (see following Table)	SC	2	-	2	90	3.5
6 courses	**TOTAL WEEKLY HOURS**		**15**	**8**	**23**	**795**	**30**

H' Semester		Category	Work Load	Credits
TO-81	Dissertation	SC	250	20
TO-82	Practical training	SC	500	10
TOTAL SEMESTER				**30**
GENERAL TOTAL TO GRADUATE		**40 courses**	**750**	**240**

ELECTIVE COMPULSORY COURSES (Semesters F' and G')		Category	TH	LAB	Total	Credits
TO-EY1	Packaging of Wine and Beverages	SC	2	-	2	3.5
TO-EY2	Wine Tourism Management	MELH	2	-	2	3.5
TO-EY3	Applied Enzymology	SC	2	-	2	3.5
TO-EY4	Technologies for Use of By-products	SC	2	-	2	3.5
TO-EY5	Sales Techniques for Wine and Beverages	MELH	2	-	2	3.5
TO-EY6	Seminar & Essay Presentation Techniques	SC	2	-	2	3.5
TO-EY7	Professional Ethics	MELH	2	-	2	3.5
TO-EY8	Design of Industries	SC	2	-	2	3.5

7.2 Course Syllabuses (Alphabetically)

COURSE SYLLABUS

COURSE TITLE:	**Ampelography**
COURSE CODE:	**TO-54**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**5 (Theory 3, Laboratory 2)**
COURSE CREDITS:	**5,5**
STANDARD ACADEMIC SEMESTER:	**5th**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is to provide knowledge regarding the geographic origin and distribution of vines, as well as viticulture diversity in Greece and the world's greatest vine-growing countries. As a result, students will become familiar with the characteristics of the various varieties and be able to assess their suitability for the viticulture of their country.

COURSE SYLLABUS

Theoretical Part of the Course

- Introduction to ampelography. Geographic and historical origin of the vine.
- The spread of viticulture worldwide from ancient times to the present day.
- Vine genesis centers and their significance.
- Systems for classifying vine types and varieties. *Vitaceae* systematics.
- Vitis genus and its types.
- Phenotypic and genotypic variation. Ampelography characteristics of vine organs. Ampelography description systems. Ampelography tables.
- Viticulture in Greece and worldwide in numbers. Vineyard products around the world (raisins, wine, table grapes, grape juice).
- Varieties and their history.
- Genetic vine improvement methods (clonal breeding, crossing or hybridization, genetic material mutations).
- *In vitro* culture and its use in genetic vine improvement.
- Creation of resistant vine varieties (current objectives, methods applied and results achieved).
- American mother vines and their hybrids used today in viticulture, and particularly in Greece.
- Criteria for selecting suitable mother vines taking into consideration the characteristics of noble grape varieties, soil and planting distances in the vineyard.

Laboratory Part of the Course

The laboratory part of the course focuses on the description and observation of the phenotypic variety of the most significant vine types in Greece and abroad and comprises the following practical laboratory exercise modules:

A) Colored varieties

1. Agiorgitiko, Roditis, Moschofilero, Xinomavro
2. Mavrodaphne, Black Corinth, Vertzami, Mesenikola Black
3. Sideritis, Muscat Hamburg, Sefka, Limnio
4. Fokiano, Mandilaria, Kotsifali, Liatiko, Romeiko
5. Cabernet sauvignon, Cabernet franc, Carignan, Grenache noir
6. Merlot, Syrah, Cinsaut, Pinot noir

B) White Varieties

7. Savatiano, Lagorthi, Robola, Debina
8. Zoumiatiko, Athirti white, Assyrtiko, Aidani white
9. Vilana, Muscat white (of Samos), Muscat of Alexandria
10. Chardonnay, Pinot blanc, Sauvignon blanc
11. Semillon blanc, Chenin blanc, Grenache blanc
12. Ugni blanc, Macabeu, Arintho
13. WeiBer Riesling, Gruner Silvaner

C) Mother Vine Varieties

14. 140Ru, 41 B, 420 A
15. 1103P, R110, SO 4

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

- Be familiar with the geographic origin and the progressive spread of viticulture in Greece and the rest of the world. As a result, they will be able to evaluate its role and significance in human civilization and be able to assess the status and potential for improvement of competitiveness with regard to the country's wine-growing sector.
- Be familiar with the geographic origin of the various varieties of the *Vitaceae* family, as well as their botanical relationship with the *Vitis vinifera* L. cultivated vine, which are directly related to the potential for application and effectiveness of the various genetic improvement methods.
- Be familiar with the characteristics of the various mother vines and especially those which are widely used in our country, so as to be able to select the best mother vine for each location.

BIBLIOGRAPHICAL REFERENCES:

Greek:

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Foreign:

1. CLARKE, O.: **Clarkes grosses Lexikon der Rebsorten.** Droemer Knaur Munchen 2001, ISBN: 3426272393.
2. GLADSTONES, J.: **Viticulture and Environment.** Adelaide: Winetitles Australia 2000, ISBN: 1875130128.
3. KERRIDGE, G.H. and ANTCLIFF, A.J.: **Wine Grape Varieties.** CSIRO Publishing 1999, ISBN: 0643059822.
4. AMBROSI, H., DETTWEILER-MUNCH, E. und RUHL, E.: **Farbatlas Rebsorten. 300 Sorten und ihre Weine.** Ulmer Verlag, Stuttgart 1998, ISBN: 3800157195
5. HILLEBRAND, W., LOTT, H. und PFAFF, F.: **Taschenbuch der Rebsorten.** Fachverlag Dr. Fraund, Mainz, 1998, ISBN: 3921156378.
6. UNWIN, T.: **Wine and the Vine: An Historical Geography of Viticulture and the Wine Trade.** Routledge; 1996, ISBN: 0415144167.

COURSE SYLLABUS

COURSE TITLE:	**Principles of Financial Science**
COURSE CODE:	**TO-36**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**MELH**
WEEKLY TEACHING HOURS:	**2 (Theory 2)**
COURSE CREDITS:	**3,5**
STANDARD ACADEMIC SEMESTER:	**3rd**

AIM AND OBJECTIVES OF THE COURSE

The purpose of the course is for students to understand the basic principles and the essential theoretical principles of economic science. They will learn to incorporate this dimension into technological considerations which is crucial to the efficiency of the wine-growing sector and wine and beverage companies. They will become familiar with the practical context of the financial dimension and its impacts, with an emphasis on microeconomics and applied economic issues in wine and beverage companies, as well as the interrelated activities of tourism, culture, environment & quality of life, gastronomy and well being. Students will also acquire skills related to selected methods and techniques of financial analysis.

COURSE SYLLABUS

Theoretical Part of the Course

The subject matter of economic science. Needs, desires and commodities. The economic problem. Production of commodities and factors of production. Scarcity of factors of production. Production probability curves. Opportunity cost. Division of labour and work. Commodity markets and production coefficients. The economic cycle. Basic functions of the financial system. Demand and consumption theory – law of demand, demand curves, elasticities of demand. Production theory. The law of supply, the law of variable proportions. Supply curves. Production costs. Types of costs. Short-term and long-term cost curves. Elasticities of supply. Commodity price fixing. Types of market. Perfect competition and pricing in perfect competition. Monopoly markets and pricing. Monopoly price discrimination. Imperfect markets. Oligopoly. Prices and production in Oligopoly. Monopolistic competition. Prices and production in monopolistic competition. Case study.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will be able to:

- Incorporate financial dimensions and assess issues relating to the wine-growing sector and the businesses directly or indirectly engaging in this sector.
- Actively participate in the preparation of financial & technical studies and development plans for the wine-growing sector, as well as in interrelated activities.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Ison, S., Introduction to Economics, Third English Edition, Kleidarithmos Publishing, Athens, 2002.
2. Mankiw, G., Principles of Economics, Tipothito Publishing, Athens, 2003.
3. Begg, D., Introduction to Economics, 2nd Edition, Volumes A' and B', Kritiki Publishing, Athens, 2006.
4. Dermot, McA., Economics for Business, Tipothito Publishing, Athens, 2005.
5. Zioganas, Ch., Principles of Microeconomics Analysis, Ziti Publishing, Thessaloniki, 2001 (In Greek).
6. Agapitos G., Guide on Basic Principles of Economics, Ziti Publishing, Athens, 2004.

Foreign:

1. Sloman, J. and Hinde, K., Economics for Business, Pearson Education Limited, 2006.
2. Krugman, P., Wells, R. and Craddy, K., Economics, Worth Publishers Inc., USA, 2007.
3. Case, K. and Fair, R., Principles of Economics, Pearson Education Limited, 2008.

COURSE SYLLABUS

COURSE TITLE:	**Aromatic Substances of Wines**
COURSE CODE:	**TO-64**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**SC**
WEEKLY TEACHING HOURS:	**2 (Theory)**
CREDITS:	**3.5**
STANDARD ACADEMIC SEMESTER:	**F'**

AIM AND OBJECTIVE OF THE COURSE

1. The aim of this course is to familiarize students with the broad classes of aromatic compounds and for students to understand their origins and the biochemical transformations they undergo in winemaking, as well their contribution to the overall flavor and taste of the wine.
2. The objective of the course is to provide students with necessary knowledge, in combination with the course in wine tasting (degustation) which is taught later, to make the right judgment and assessment of a wine, so as to be able to intervene to all stages of production in order to improve it.

COURSE DESCRIPTION

Theoretical Part of the Course

- Aroma and taste in wine
- Basic biochemical production pathways of the major primary aromatic compounds.
- Fatty acid metabolism – Production of linear volatile compounds (Aromatic aldehydes, ketones, esters and lactones)
- Secondary metabolites deriving from enzymic action
- Terpenic compounds – Monoterpenes
- Alcohols and phenols and their effect on wine's taste and flavor
- Nitrogen compounds, pyrazines
- Sulfur compounds, thioles
- Oxidation and aging of wines
- Wine aging in barrels – Oak wood, extraction of characteristic aromatic compounds.
- Wine changes, off flavors, cork-related flavors.
- Wine changes deriving from bacteria, acidic bacteria, yeast. Sulfurous off flavours
- Wine aromatic compound analysis techniques

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Comprehend the biochemical production pathways of major aromatic compounds of wine and their biotransformation.
- Be familiar with the broad classes of aromatic compounds, such as terpenes, linear aromatic compounds, nitrogen compounds, sulfur compounds and comprehend their role in the overall flavor and taste of wine.
- Comprehend their evolution during winemaking and aging.
- Distinguish off flavours in wine and identify their potential origin aiming to improve the wine produced.

BIBLIOGRAPHICAL REFERENCES:

Greek:

2. Tsakiris, A., “Oenology: Research and Applications”, Psichalou (2005) (in Greek)
3. Tsakiris, A., “Oenology: From grape to wine", Psichalou (2000) (in Greek).
4. Soufleros, I., “Oenology: Science and Technology”, Soufleros (2000) (in Greek).
5. Kourakou-Dragona, S., “Oenology Issues”, Trochalia (1998) (in Greek).

Foreign:

6. Margalit, Y., "Concepts in Wine Chemistry", The Wine Appreciation Guild, San Francisco (2004).
7. Schreier, P., "Chromatographic Studies of Biogenesis of Plant Volatiles", Huthig, Heidelberg (1984).
8. Jackson, Ron S, "Wine Science: Principles and Applications", Academic Press (1994).

COURSE SYLLABUS

COURSE TITLE:	**Basic Winemaking Techniques/Technologies**
COURSE CODE:	**TO-44**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**5 (Theory 3, Laboratory 2)**
COURSE CREDITS:	**5,5**
STANDARD ACADEMIC SEMESTER:	**4th**

AIM AND OBJECTIVES OF THE COURSE

This course could be viewed as an introduction to the various winemaking technologies. Information is provided regarding the physiology & chemical composition of grapes during maturation, such that students will acquire the requisite knowledge linking raw material quality to that of the final product. They will also become familiar with the thought mechanisms that will permit them to make critical decisions regarding the handling of raw materials. At the same time, students will acquire fundamental knowledge of techniques which are generally applicable regardless of the type of wine they intend to make as oenologists.

COURSE SYLLABUS

Theoretical Part of the Course

The concept of Technological Maturity. Description of grapes during maturation. Progressive stages of chemical composition of the grape during maturation. Determining maturity and the concept of Harvest. Effect of various external factors on the maturation process. The effect of *Botrytis cinerea.*

Wine harvest. Treatment and pro-fermentation interventions in raw materials. Selecting harvesting dates and methods. Over-maturation. Correction of grape must acidity. Increasing grape must sugar content. Enzymatic changes & reactions in grapes after their harvest. Use of preparations containing industrial enzymes in winemaking.

Use of sulphur dioxide in grape musts and wines. Incorporation & effects of sulphur dioxide on human physiology. Chemical properties of sulphur dioxide. Compounds which bind to sulphur dioxide. Practical consequences and forms of sulphur dioxide in wines. Microbiostatic & germicidal properties of sulphur dioxide. Use of sulphur dioxide in winemaking.

Products and techniques used in conjunction with sulphur dioxide. Sorbic acid. Fatty acids. Ascorbic acid. Lysozyme. Niacin. Pasteurization. Use of inert gases.

Use of selected yeast strains in winemaking. Yeast technology. Control of alcoholic fermentation. Cycle of yeast development and the kinetics of alcoholic fermentation. Nutritional requirements of yeasts. The various active ingredients in alcoholic fermentation. Factors inhibiting alcoholic fermentation. Various physicochemical

factors affecting the development of yeasts and the alcoholic fermentation process. Problems arising from partial alcoholic fermentations and how they can be handled. Grafting techniques.

Laboratory Part of the Course

1. Technological maturity of grapes and its importance.
2. Changes in the chemical composition of grapes during maturation
3. Effect of external factors on the maturation process – The botrytis cinerea effect
4. Wine harvest – Raw material handling according to winemaking conditions.
5. Winemaking – Utilization of mechanical equipment for the production of grape must.
6. Grape must treatment - preparatory sedimentation procedures (white winemaking) – preparatory fermentation procedures (red winemaking).
7. Control of grape must sugar content, acidity and pH – Correction of grape must constituents.
8. Enzymatic changes due to enzyme activity. The significance of enzyme use in winemaking
9. Use of selected yeasts in wine production
10. Chemical behavior of sulphur dioxide.
11. Use of sulphur dioxide in winemaking
12. Products – techniques used in conjunction with sulphur dioxide
13. Alcoholic fermentation – Physicochemical factors affecting yeast development – progressive alcoholic fermentation.
14. Problems arising from partial fermentations and how they can be handled.
15. Preparatory tasks for stabilization and establishment of maturation conditions in wine

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

- Be familiar with the progressive development of chemical composition during maturation of the grape, as well as the effect of various external factors on the progress of grape maturation.
- Be able to undertake the necessary handling and pre-fermentation interventions to raw materials and to use selected yeast strains in winemaking.

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Greek:

9. Evaggelos Soufleros. "Oenology. Science and expertise - T 2" (In Greek). Copyright © 1997. ISBN : 960 9699 1 6 , Set : 960 699 2 4
10. Stavroula Kourakou-Dragona. "Oenology Issues". Trochalia Publishing, Athens 1998 (In Greek). ISBN : 960 7809 29 7.
11. Argiris Tsakiris. "Oenology. From grape to wine". Psichalos Publishing. Athens 1998 (In Greek). ISBN : 960 7920 05 8.

Foreign:

1. Pascal Ribereau-Gayon, Yves Glories, Alain Maujean, Denis Dubourdieu. "Traite d' CEnologie -(Vol.1) ". Dunod, Paris 1998. ISBN : 2 10 003948 1.
2. Ron S. Jackson. "Wine science. Principles and applications". Academic Press, Inc. California, 1994. ISBN : 0 12 379060 3.
3. Emile Peynaud. "Connaissance et travail du vin". Dunod, Paris 1981. ISBN : 2 04 011417 3.
4. Les Entretiens Scientifiques Lallemand. "La microbiologie des vins mousseux V 3". Lallemand © Toulouse 1994.
5. Les Entretiens Scientifiques Lallemand. "Fermentation Technology V 2". Lallemand © Toulouse 1994.
6. Hans R. Luthi et Ulrich Vetsch. "Analyses et Appreciation Microscopiques de vins et jus de fruits dans la pratique", Collection Avenir Cnologie.
7. Roger B.Boulton et al. "Principles and practices of winemaking", Aspen Publishers Inc., New York, c1996, ISBN : 08342 127 06.
8. Bruce W. Zoecklein et al. "Wine analysis and Production", Chapman & Hall, New York, c 1995, ASIN : 041 298 2412.
9. Kenneth C. Fugelsang. "Wine Microbiology", Aspen Publishers Inc., New York, c1997, ISBN : 04120 661 14.
10. Cornelius S. Ough. "Winemaking basics", Haworth Press, New York, 1991, ISBN : 15602 200 58.
11. Richard P. Vine et al. "Winemaking : From grape growing to marketplace", Chapman & Hall, New York, c 1997, ISBN: 083421699x.
12. David R. Storm. "Winery utilities : planning, design and operation", Aspen Publishers Inc., New York, c1997, ISBN: 08342 198 16.

COURSE SYLLABUS

COURSE TITLE	**Plant Biology**
COURSE CODE	**TO-16**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: CGS**
WEEKLY TEACHING HOURS	**: 5 (Theory 3, Laboratory 2)**
CREDITS	**: 5.5**
STANDARD ACADEMIC SEMESTER	**: A'**

AIM AND OBJECTIVE OF THE COURSE

The aim of the course is to provide students with contemporary knowledge of the structure and basic functions of organisms, with an emphasis on plants. It includes modules in experimental and applied plant biology, including cellular and molecular biology, genetics, developmental physiology, biochemistry and biotechnology. The acquired knowledge is necessary for a modern oenologist, so as to be able to comprehend the variety and complexity of biological processes taking place within the wine production system, from vine culture to winemaking.

COURSE DESCRIPTION

Theoretical Part of the Course

- Eukaryotic plant cells: cellular theory. Structure and function of organelles, biological membranes and cell walls.
- Chemical composition of biological systems. Biological macromolecules: Carbohydrates, Lipids, Proteins, Nucleic acids.
- Energy flow in biological systems
- Genetic information flow and Molecular Biology principles: Nature of genetic material, DNA structure, DNA replication, DNA transcription, genetic code, mRNA translation, gene expression regulation.
- Genetic principles: Mendel's Laws. Mitosis and meiosis. Chromosomes as genetic information carriers, alleles, mutations.
- Introduction to plant morphology and anatomy: development of plant bodies, anatomy and functions of vegetative and reproductive organs.
- Basic physiological plant processes (photosynthesis, respiration, transpiration)
- Water-based relationships, mineral nutrition, secondary metabolites.
- Developmental physiology
- Stress physiology.

Laboratory Part of the Course

The laboratory part includes the following practical exercise modules:

- Principles of microscopy.

- Microscopic observation to identify cell walls, nucleus and major organelles in plant cells.
- Observation and study of protective tissues: epidermis and its components (root hairs, stomata) and their mechanical-supportive tissues.
- Microscopic observation of fundamental (parenchymal) tissues, duct tissues and transfer elements.
- Plants mineral nutrition (observation of symptoms of lack of nutrients in plant development).
- Photosynthesis (chloroplasts isolation and measurement of their reductive potential).
- Water-based relationships in plant tissues (determination of water potential).
- Plant hormones (phyto-hormones) and plant growth.
- In vitro culture of plant tissue.
- DNA isolation from plant tissue and agarose gel electrophoresis.
- Polymerase chain reaction (PCR) for the enhancement of gene segments.
- Protein isolation from plant tissue and acrylamide gel electrophoresis.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Be familiar with the basic structure and function of cells, tissues and organs of plant organisms.
- Be able to evaluate environmental effects in plant physiology.
- Be able to design and implement the experimental approaches of modern biology for the study and resolution of problems arising in the vine-wine-biological system.
- Comprehend basic concepts in a group of courses related to biological and agricultural sciences, such as microbiology, biochemistry, biotechnology, morphology-physiology and vine culture.
- Meet the demands of a postgraduate program related to the biological sciences, such as food science and technology, viticulture-oenology, sustainable development and biotechnology.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Aivalakis, G., Karabourniotis, G., Fasseas, K., "General Botany: Morphology, anatomy and physiology of superior plants", Embryo Publications, 2005 (in Greek).
2. Vlachos, I.K., Kollaros D., "Manual of botany laboratory", Ion Publications, 2001 (in Greek).
3. Vlachos, I.K., "Botany: Cell biology, anatomy and plant morphology", Ion Publications, 1999 (in Greek).
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5. Tsekos, I., "Botany, structure, functional action and plant biology", Kyriakides Brothers Publishing House, Thessaloniki, 2001 (in Greek).
6. Tsekos I. Elias H.F., "Morphology and plant anatomy", Kyriakidis Brothers Publishing House, Thessaloniki, 2007, (in Greek).
7. Chatzopoulos P., "Plant Biotechnology, Embryo Publications", 2001 (in Greek).

Foreign:

1. Bregmann A.A., Laboratory investigations in Cell and Molecular Biology. 4th Edition. New York: John Wiley, 2002.
2. Gruissem W. & Jones R.L., Biochemistry & Molecular Biology of Plants, Buchanan B.B., Wiley J & Sons, Ltd., 2002.
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6. Leyser O. & Day S., Mechanisms in Plant Development, Blackwell Publishing, 2002.
7. Roger R. M.J., Handbook of Plant Ecophysiology, Techniques, Kluwer Academic Publishers, 2001.
8. Scott P., Physiology and Behaviour of Plants, John Wiley & Sons Inc., 2008
9. Slater A., Nigel W.S, Fowler M.R., Plant Biotechnology, Oxford University Press, 2003
10. Stern, Kingsley Rowland, Shelley Jansky, James E. Bidlack. Introductory Plant Biology. 9th ed. Boston, MA: McGraw-Hill, 2003.
11. Taiz L., Zeiger E., Plant Physiology, 4th edition, Sinauer Associates Inc., 2006

COURSE SYLLABUS

COURSE TITLE:	**Biotechnology and Industrial Fermentations**
COURSE CODE:	**TO-42**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**CSS**
WEEKLY TEACHING HOURS:	**6 (Theory 3, Laboratory 3)**
CREDITS:	**7.5**
STANDARD ACADEMIC SEMESTER:	**D'**

AIM AND OBJECTIVE OF THE COURSE

The course aims to inform students regarding biotechnological processes and methods and familiarize them with new materials currently used in yeast biotechnology and industrial fermentations.

COURSE DESCRIPTION

- Application of Biotechnology in Agriculture and the food industries with an emphasis on the wine, beer and beverage industry. Genetic improvement of microorganisms (bacteria, yeast and fungi). Genetically modified microorganisms – genetically modified foods.
- Isolation, production and use of pure cultures (wild strains) to wine and beer production.
- Study of the kinetics of microorganism development.
- Kinetics of substrate degradation. Kinetics of production
- Factors affecting the kinetics of development and metabolism of microorganisms. Technology of fermentations
- Aerobic and anaerobic processes. Stages of fermentation (pre-fermentation, primary- post-fermentation). Biological constants of a fermentation process.
- Types of bioreactors, design, operation, control, biosensors.
- Factors affecting the development of microorganisms in bioreactors. Continuous – semi-continuous – batch culture
- Industrial applications of solid phase fermentations and submerged fermentations. Immobilization of microorganisms and enzymes: methods, properties, advantages and disadvantages compared to classic fermentation methods. Applications in the wine, beer and beverage industry.

- Alcohol production: raw materials, alcoholic fermentation, techniques and economic data. Applications of modern fermentation techniques in the beer industry. Modern methods of detection and determination of pathogenic microorganisms and their toxins in food and beverages (ELISA, PCR, electrical conductivity, etc). Biotechnology and quality assurance of foods, consumer health assurance. Bioethic elements.

Theory Modules

- Module 1. Acquaintance with the course in Microbial Biotechnology and Industrial fermentations. The concept of integrated winemaking.
- Module 2. Introduction to Molecular Genetics
- Module 3. Genetic modification and applications.
- Module 4. Microbial products for the protection and improvement of plants
- Module 5. Microbial kinetics of microorganisms development
- Module 6. Microbial population determination methods.
- Module 7. Bioreactors and fermentation types – applications.
- Module 8. Technology of fermentations
- Module 9.
- Module 10. Fermentation of agro-industrial sub-products for the production of high-value-added products.
- Module 11. Solid phase fermentations
- Module 12. Immobilization and micro-caging of microorganisms and enzymes
- Module 13. Production of energy alcohol: raw materials, alcoholic fermentation, techniques and economic data.
- Module 14. Production of bacterial cellulose and organic acids from winemaking sub-products
- Module 15. Production of microbial enzymes

Laboratory Modules

- Module 1. Introduction to biotechnology
- Module 2. Types of fermentations and bioreactors
- Module 3. Vaccine preparation
- Module 4. Kinetics of microbial cultures
- Module 5. Effect of substrate type to the productivity and performance of a fermentation
- Module 6. Effect of substrate's initial concentration to the productivity and performance of a fermentation
- Module 7. Effect of substrate's initial acidity to the productivity and performance of a fermentation
- Module 8. effect of sulfur dioxide to the productivity and performance of a fermentation
- Module 9. Immobilization techniques of enzymes
- Module 10. Production of sparkling wines with immobilized yeast
- Module 11. Production of bacterial cellulose from acidic bacteria
- Module 12. Diagnostic biotechnology - toxins
- Module 13. Production of ethanol with solid phase fermentation
- Module 14. Production of pigments with fermentation
- Module 15. The polymerase chain reaction method

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Be familiar with the terminology and subject fields in Biotechnology and the techniques of microbial technology.
- Be able to evaluate the fermentation potential of microorganisms
- Be familiar with the concept of integrated winemaking
- Be able to design and analyze diagrams of fermentation processes and other biotransformations used in the production of wine, beer and other beverages.
- Be able to implement biotechnology techniques for the recovery of wine and beer sub-products (biomass, CO_2).

Moreover, it aims to:

- Enable students develop their own opinion regarding the use of genetically modified microorganisms and foods.
- Acquaint students with new production methods and quality control of new products based on biotechnology applications, by comprehending both classical and modern analysis and identification techniques of genetic material (PCR), as well as other techniques currently used for the detection of pathogenic microorganisms and toxic substances in food (immune-biological ELISA, etc)

BIBLIOGRAPHICAL REFERENCES:

Greek:

- Nerantzis Elias (2002) Microbial Technology. Notes, T.E.I. of Athens (in Greek)

Foreign:

- Campbell I. & J H Duffus (1991) Yeast: a practical approach. IRL Press
- Lasking I. Allen (1985) Enzymes and immobilized Cells in Biotechnology. Biotechnology Series, The Benjamin /Cumming Publishing Company, Inc., London
- Verachtert Hubert and Rene De Mot (Editors) (1990) Yeast Biotechnology and biocatalysis. Marcl Dekker, Inc. New York and Basel
- Graham H.Fleet. Chur (1993) Wine microbiology and Biotechnology; Philadelphia, Pa. Harwood Academic Publishers,

COURSE SYLLABUS

COURSE TITLE	**: Biochemistry**
COURSE CODE	**: TO-31**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: CGS**
WEEKLY TEACHING HOURS	**: 5 (Theory 2, Laboratory 3)**
CREDITS	**: 5.5**
STANDARD ACADEMIC SEMESTER	**: C'**

AIM AND OBJECTIVE OF THE COURSE

The theoretical part of the course aims to enable students to comprehend basic biochemical concepts.

The laboratory part of the course aims to enable students to apply biochemical methods for the measurement of alcoholic fermentation products.

COURSE DESCRIPTION

Theoretical Part of the Course

Biological macromolecules: Carbohydrates, proteins, lipoids, nucleic acids.

Principles of bioenergetics

Enzymes: catalysis mechanisms, special categories, classification.

Allosteric enzymes.

Co-enzymes and additive groups.

Metabolism. Stages of metabolism.

Carbohydrate metabolism. Mechanisms of respiration and fermentation.

Fermentation types: alcoholic fermentation, lactic fermentation, incomplete oxidations.

Protein metabolism. Aminoacids reactions, proteins biosynthesis.

Lipoid metabolism, fatty acids beta-oxidation.

Structure and properties of cellular membranes.

Photosynthesis: light and dark reactions of photosynthesis.

Laboratory Part of the Course

The laboratory part of the course includes practical exercises in the function of enzymes and their use in Oenology as well as practical exercises exploring factors affecting alcoholic fermentation.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Comprehend the mechanisms governing biochemical reactions in living cells.
- Be able to determine the effect of various factors in the progress of alcoholic fermentation with biochemical methods.
- Be able to use biochemical and enzymic methods for the determination of the various products of alcoholic fermentation.

BIBLIOGRAPHICAL REFERENCES:

Greek:

➢ L.Stryer: Biochemistry. Crete University Press (1997) (in Greek)

Foreign:

➢ P. Karlson: Biochemie. Thieme Verlag (1994)

➢ A. Lehninger: Principles of Biochemistry. de Gruyter New York (2004)

➢ L.Usseglio-Tomasset : Chimie oenologique. Technique et Documentation-Lavoisier (1995)

➢ G.Wuerdig (ed.) : Chemie des Weines. Ulmer Verlag (1989)

COURSE SYLLABUS

COURSE TITLE:	**General and Inorganic Chemistry**
COURSE CODE:	**TO-11**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**CGS**
WEEKLY TEACHING HOURS:	**7 (Theory 4, Laboratory 3)**
CREDITS:	**8.0**
STANDARD ACADEMIC SEMESTER:	**A'**

AIM AND OBJECTIVE OF THE COURSE

The aim of the course is to provide students with a broad knowledge of chemical phenomena to a satisfactory depth, so that they will be able to follow the subsequent specialized Chemistry courses of the Department.

COURSE DESCRIPTION

Theoretical Part of the Course

A. General Chemistry:

1. Unit Systems. Atomic structure. Periodic table of Elements.
2. Inorganic compound nomenclature.
3. Chemical reactions, chemical equations and stoichiometry.
4. Chemical bonds.
5. Molecular geometry.
6. Introduction to chemical thermodynamics.
7. Introduction to states of matter.
8. Introduction to ideal and non-ideal solutions as well as to colloidal systems of dispersion.
9. Introduction to chemical kinetics.
10. Chemical balance in acids, bases, salts and complex compounds.

B. Inorganic Chemistry (Chemistry of selected elements and their compounds):

11. Groups (Families) 1, 2, 13 of the Periodic Table. Properties of Na, K, Mg, Ca, Ba, B, AI and their compounds.

12. Groups (Families) 14, 15 of the Periodic Table. Properties of C, Si, Sn, Pb, N, P, As and their compounds.
13. Groups (Families) 16,17 of the Periodic Table. Properties of O, S, F, Cl, Br, I and their compounds.
14. Groups (Families) 6, 7, 8, 9, 10 of the Periodic Table. Properties of Cr, Mn, Fe, Co, Ni and their compounds.
15. Groups (Families) 11, 12 of the Periodic Table. Properties of Cu, Ag, Au, Zn, Cd, Hg and their compounds.

Laboratory Part of the Course

1. Equipment – Materials – Reagents – Laboratory Safety.
2. Analytical balance – processing results of experimental measurements.
3. Density measurement.
4. Solutions: Preparation and dilution of solutions from a dense solution and solid substances.
5. Chemical reaction categories – Stoichiometry of a reaction.
6. Solubility of compounds.
7. Separation of phases – Sample drying.
8. Additive properties of solutions: Determining molar mass by freezing point depression.
9. Chemical Kinetics and balance - Le Chatelier Principle.
10. Chemical balance – pH measurement.
11. Buffers.
12. Elements reactions of representative groups.
13. Qualitative cation analysis of Groups I & II.
14. Qualitative cation analysis of Groups III.
15. Qualitative anion analysis.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Comprehend and be able to interpret simple chemical phenomena.
- Be familiar with the chemical properties of characteristic elements and their compounds as well as their role in nature and common industrial applications.
- Be able to solve simple chemical problems methodically.
- Be able to use laboratory equipment to conduct simple experiments.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. A. Sachande, S. Papaconstantinou, A. Chatzilazarou «Laboratory Exercises in General and Inorganic Chemistry», Publishing House B. Giourdas 2007 (in Greek)
2. M. Lalia-Kantouri, S. Papastefanou «General and Inorganic Chemistry», Ziti Publications 1995 (in Greek)
3. S. Papaconstantinou «General and Inorganic Chemistry – Supplementary theory notes», T.E.I. of Athens 2008 (in Greek)
4. N.D. Kloura «Basic Inorganic Chemistry», Costaraki Publications 1995 (in Greek)
5. P.P. Karagiannidis «Special Inorganic Chemistry», Ziti Publications 1999 (in Greek)
6. D.D. Ebbing, S.D. Gammon «General Chemistry», Publications. Travlos 2002 (in Greek)

Foreign:

1. L. Jones, P. Atkins "ChemicalPrinciples", Freeman 2004
2. R. Chang "Chemistry, 8th ed.", WBC-McGraw-Hill 2006
3. J.F. Hall "Experimental Chemistry, 3rd ed.", Heath 1993
4. J. Emsley "Nature's Building Blocks", Oxford University Press 2003
5. G.J. Shugar, J.T. Ballinger "Chemical Technicians' Ready Reference Handbook, 4th ed.", McGraw-Hill 1996

COURSE SYLLABUS

COURSE TITLE:	**General Microbiology**
COURSE CODE:	**TO-24**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**GSC**
WEEKLY TEACHING HOURS:	**6 (Theory 3, Laboratory 3)**
CREDITS:	**7.5**
STANDARD ACADEMIC SEMESTER:	**B**

AIM AND OBJECTIVE OF THE COURSE

The course aims to introduce students to concepts and laws governing the microbial world. After completion of the course, students will have a full picture of microorganisms and the means and methods of managing microbiological material.

COURSE DESCRIPTION

Introduction to the microbial world, differences between prokaryotic and eukaryotic cells, aseptic techniques, sterilization, protozoa microscopy, nutritious substrates, vaccination and culture of bacteria and yeast, microorganisms isolation from the environment, stains, yeasts and moulds morphology, metabolism of the production of extracellular inductive enzymes, environmental factors affecting microorganisms development, method of consecutive dilutions, microbiological water analysis

Theoretical Part of the Course

1. Introduction to the microbial world.
2. Structure and function of a microbial cell (Bacteria)
3. Categories of prokaryotic microorganisms
4. Eukaryotic microorganisms
5. Microbial development
6. Control of microbial development
7. Microorganisms physiology
8. Microbial metabolism, Energy
9. Microbial metabolism - Biosynthesis
10. Organization and properties of microbial genome
11. Fungi
12. Yeasts

13. Viruses
14. Microorganisms and the environment
15. Microorganisms and industry

Laboratory Part of the Course

- PROTOZOA MICROSCOPY
- STERILIZATION – ASEPTIC TECHNIQUES
- VACCINATION AND CULTURE OF BACTERIA AND YEAST
- MICROORGANISM ISOLATION FROM AIR AND SOIL

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will be able to:

- Use microbiological methods and materials and manage laboratory equipment
- Correlate microorganisms' action with the result in food and environment quality
- Analyze microbiological samples of water
- Have a complete picture of microbial biodiversity

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Elias Nerantzis 2005 Notes of General Microbiology, T.E.I. of Athens (in Greek)
2. Stefanos Koliais Microbiology 1986 University Press (in Greek)

COURSE SYLLABUS

COURSE TITLE:	**Professional Ethics**
COURSE CODE:	**TO-EY7**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**MELH**
WEEKLY TEACHING HOURS:	**2 (Theory 2)**
CREDITS:	**3.5**
STANDARD ACADEMIC SEMESTER:	**G**

AIM AND OBJECTIVE OF THE COURSE

The course aims to enable students to understand the concepts and principles of scientific and professional ethics and apply them to the particular ethical dimensions which may emerge in the practice of the profession of Oenologist and Beverage Technologist.

COURSE DESCRIPTION

Theoretical Part of the Course

Ethics- Professional Ethics: basic concepts, definitions. Approaches to ethical theorizing – types of ethical theories and their problems (Deontological ethics, utilitarianism, contractarianism.)

International and national codes of moral obligation. Philosophical and Legal Approaches. Anatomy of moral dilemmas. Methodology of a decision. The personality of the graduate as a determining factor in decision making. Responsibility for decisions. Rights and needs of citizens and consumers.

Work ethics. Scientific ethics. Scientific publications. Free movement of ideas and goods, and establishment of rights (patents, registration of names, intellectual property rights, trademarks, business-trade secrets, copyright, creative protection in multimedia, etc).

Ethical dimensions in production, distribution, marketing and consumption of food and beverages from safety, hygiene, suitability, adulteration and commercial trade perspectives at the national and international level.

Bioethics and oenology – food and beverage technology. Traditional issues in food ethics.

Bioethics and biotechnology – genetic mechanics (genetically modified organisms and crops). Legal, ethical and social considerations in food and beverage biotechnology. Emerging issues (hazards, hygiene, ecology).

National, European, and international legislation and genetically modified organisms. Case studies: Polkinghorne Committee. The cases of Monsanto, Agrevo, Novartis industries.

Bioethics in food and society: Consumer information, food and beverage labeling, etc. The concept and importance of the authenticity of food and beverages produced.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

1. Comprehend ethical theories and ethical considerations.
2. Be familiar with national and international codes of moral obligation and the current legal framework governing scientific issues in their field and have acquired the necessary knowledge to address and resolve ethical issues emerging in the application of their scientific field.
3. Understand their ethical role as graduates, in research, development and production of safe and acceptable quality products by consumers, and acquire the skills to apply rational criteria in areas related to their field.
4. Be familiar with the basic principles and concepts of professional ethics in public welfare issues, preservation of natural resources, as well as in the description and critical discussion of cultural perception, quality improvement and ethical practices in marketing.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Tribute to Biotechnology and Bioethics. (2001). Indiktos journal, **14,** June 2001 (in Greek)
2. Dragona Monachou, M. (1995) Modern Ethical Philosophy, Ellinika Grammata Publications ISBN 960344-092-2 (in Greek)

Foreign:

1. Oakley, J. (2001) Virtue Ethics and Professional Roles. Cambridge University Press. ISBN 052179305X
2. Menikoff, J. (2001) Law and bioethics: An introduction. Georgetown University Press. ISBN 087840838X
3. Bouchoux, D.E. (2001) Protecting Your Company's Intellectual Property: A Practical Guide to Trademarks, Copyrights, Patents & Trade Secrets. AMACOM. ISBN: 0814406017
4. Rugiero, V.R. (2000) Thinking Critically about Ethical Issues. Mayfield Publishing Company. ISBN 0767415825
5. Sterckx, S. (2000) Biotechnology, Patents and Morality. Ashgate Publishing Company. ISBN: 0754611442
6. Ferrel, O.C., Fraedrich,J., Ferrel,L. (2000) Business Ethics: Ethical decision Making and Cases. Houghton Mifflin College. ISBN 0395959535
7. Rosenthal, S.B., Buchholz,R.A. (1999) Rethinking Business Ethics: A pragmatic Approach. Oxford University Press. ISBN 0195117360

8. Carrol, A.B., Bucholz, A.K. (1999) Business and Society: Ethics and Stakeholder Management. 4th edition. South-western Pub. ISBN 0324001029
9. Davis, M. (1998) Thinking Like an Engineer: Studies in of a Profession. Oxford University Press. ISBN 0195120515
10. Institute of Food Technologists. (1998) Food and Drink Good Manufacturing Practice. 4th ed IFT, London. ISBN: 0905367154
11. Thomson, P.B. (1997) Food Biotechnology in Ethical Perspective. Aspen Publishers, Inc. ISBN 0412783800
12. Deveer, Van D., Pierce,C., VanDeVeer,D. (1997) Environmental Ethics and Policy Book: Philosophy, ecology, Economics. WadsworthPub Co. ISBN 0534525245
13. Reiss, M.J., Straughan,R. (1996) Improving nature?:the science and ethics of genetic engineering. Cambridge University Press. ISBN 0-521-45441-7
14. Mepham, B. (1996). Food Ethics (Professional Ethics). Routledge. ISBN 0415124514
15. Frankel, M.S. (1996) Professional Ethics Report. American Society for the Advancement of Science. Scientific Freedom, Responsibility and Law Program in collaboration with the Committee on Scientific Freedom and Responsibility and the Professional society Ethics Group. Volume IX,No 1, Winter 1996.
16. Food Ethics Council. Novel Foods; Beyond Nuffield. A Food Ethics Council Report.
17. Donaldson,T., Al Gini. (1995) Case studies in Business Ethics. Prentice Hall. ISBN 0133824330
18. Wueste, D.E. (1994) Professional ethics and Social Responsibility. Rowman & Littlefield. ISBN 0847678164
19. Council of Biology Editors (1990) Ethics and Policy in scientific Publication. ISBN: 0914340093
20. Codex Alimentarius Commission. (1985) Code of Ethics for International Trade in Food. CAC/RCP 20-1979 (Rev. 1-1985). Joint FAO/WHO Food Standards Programme, FAO, Rome.

COURSE SYLLABUS

COURSE TITLE	**: Quality Management**
COURSE CODE	**: TO-45**
COURSE TYPE	**: Theoretical**
COURSE CATEGORY	**: CSS**
WEEKLY TEACHING HOURS	**: 3 (Theory)**
CREDITS	**: 5.0**
STANDARD ACADEMIC SEMESTER	**: E'**

AIM AND OBJECTIVE OF THE COURSE

1. The course aims to enable students to comprehend, as Quality Assurance Managers, the concepts and philosophy of quality in quality control, assurance and generally, quality management in the food and beverage industries.
2. The objective of the course is to enable students to implement systems and methods needed for quality assurance and improvement.

COURSE DESCRIPTION

Theoretical Part of the Course

- The concept of quality, quality characteristics of food and beverages, legislative demands for food and beverage quality.
- Principles and methods of quality control
- Organization and implementation of quality control and laboratory accreditation.
- Quality control – Methods of sensory evaluation, organization of sensory testing
- Quality Assurance and Total Quality Management,
- Quality Management - Tools to improve processes in management of quality systems within the context of statistical control of processes.
- Quality Assurance Systems - ISO 9000 Standards
- Application of the ISO 9000 System in the food and beverages industries
- Concept and principles of HACCP system, hazard categories
- Food health and safety – ISO 22000 standard
- Hazard Analysis and categories, determination of critical control points (CCPs) and determination of critical limits of CCPs
- Applications of HACCP system in alcoholic beverages
- Quality design and new products development
- Quality improvement, Quality Policy and Business Strategy
- Water quality.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will be able to:

- Comprehend the concepts and policies in quality control, businesses strategy and the application of total quality management in the food and beverage industries.
- Be familiar with the demands of quality management systems and have developed skills in the design and application of relevant programs.
- Be familiar with the principles and methods of food and beverage quality control and be able to apply them in all the stages of the manufacturing process.
- Comprehend the operation of accredited quality control laboratories and be able to organize such laboratories.
- Identify potential hazards which may be connected with a food at all stages of its production and minimize the possibility of safety problems arising with respect to the foods in question.

BIBLIOGRAPHICAL REFERENCES:

Greek:

- Kazazis, I., General Food Quality Control, Organization for the Publication of Textbooks (1995) (in Greek)
- Arvanitoyiannis, I. S., Efstratiadis, M. M., Boundouropoulos I.D. ISO 9000 and ISO 14000, UNIVERSITY STUDIO PRESS (2000) (in Greek)
- Tzia, K., Tsiapouris A., Hazard Analysis at Critical Control Points (HACCP) in food industry, Papasotiriou (1996) (in Greek)

Foreign:

- Stevenson, K.E., Bernard, T., HACCP: A systematic approach to food safety. CTI Publications (1999)
- Early, R., Guide to Quality Management Systems for the Food Industry. Blackie Academic & Professional, Chapman & Hall, Glasgow (1995).
- Codex Alimentarius Commission, Principles and Guidelines for the conduct of microbial risk assessment. CAC/GL-30 (1999).

COURSE SYLLABUS

COURSE TITLE:	**Soil - Climate System and the Vine**
COURSE CODE:	**TO-32**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**4 (Theory 2, Laboratory 2)**
COURSE CREDITS:	**4,0**
STANDARD ACADEMIC SEMESTER:	**3rd**

AIM AND OBJECTIVES OF THE COURSE

The course aims to familiarize students with the necessary knowledge base and conceptual background through which they will be able to study the soil-climate conditions of an area in order to assess its potential and suitability for the purposes of vine cultivation and the production of high-quality products.

COURSE SYLLABUS

Theoretical Part of the Course

- **Meteorology:** Atmosphere structure and dynamics. Phenomenology. Air mass movement. Formation of low-level and high-level air masses. Fronts and depressions. The meteorological variables of solar radiation, air, temperature, moisture, wind and precipitation. Changes in atmospheric composition. Atmospheric pollution. Agrometeorological and climate stations. Meteorological instruments and observation of temperature, moisture, evaporation rate, sunlight, cloudiness, solar radiation, height of water deposits, barometric pressure, wind force and direction. Data processing. Climates in general. Types of climatic zones. Climate of Greece. Climate variability. Macro- and microclimate of a vineyard.
- **Soil science:** Soils and their evolution. Historical review. Soil systems. Soil formation. Formation and constitution of soils. Important metals and their properties. Main soil constituents. Soil erosion. Particle composition of soils. Soil particle fractions and their natural role. Classes of soil particle constitution. Mineralogical composition of soils. Primary minerals: structure, physicochemical properties, degeneration. Secondary minerals: structure, physicochemical properties of aluminosilicate minerals, iron and aluminum oxides and hydroxides, water soluble minerals. Ground water and energy and management. Physicochemical properties of soils and their effect on vine physiology. Degree of base saturation. Z electric potential, Flocculation of colloids. Soil acidity and its significance for viticulture. Improvement of acid soils. Soil buffer capacity. Soil erosion. Phase stability. Ion exchange and adsorption. Organic matter in soils. Humus & organometallic compounds. Clay-humus complexes. Significance of organic matter. Physical properties of soil: structure, porosity, structure improvement, soil solution and electrolytes, soil temperature and its significance. Morphology of soil: territorial distribution, soil color, soil distribution and description, soil horizon layers and levels. Soil classification. Classes of Greek soils. Soil mapping and description of mapping units. Soil fertility in general.

Determination of fertility. Main nutrients: nitrogen, phosphorus, potassium, calcium, magnesium and trace elements. Fertilizing elements.

- **Ecology:** Soil ecology. Ecosystems. Stability of Ecosystems. Field and vineyard ecology. Soil organisms. Evaluation and assessment of soils. Environmental factors and their effect on organisms.

Laboratory Part of the Course

- Particle composition of soils
- Mineralogical composition of soils
- Physical properties of soils
  - o Soil structure
  - o Soil porosity
- Chemical properties of soils
- Degree of base saturation
- Z electric potential
- Soil acidity
- Soil buffer capacity.
- Ion exchange and adsorption
- Organic matter in soils.
- Determination of fertility

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

1. Be familiar with basic concepts and principles in meteorology, in order to research various meteorological and climatologic factors of an area which may affect vine growing.
2. Be familiar with the main elements and principles of physical soil chemistry, so as to be able to estimate the needs of a vineyard in nutrients and water.
3. Be familiar with modern methods and instruments used in meteorology, in order to carry out and evaluate meteorological measurements in a vineyard.
4. To organize and take soil samples in a vineyard, as well as to examine and evaluate the results of the main types of soil analysis.

BIBLIOGRAPHICAL REFERENCES:

Greek:

7. KALIVAS D. (2003): **Soil science – Evaluation of soils, location-based climate conditions and wine.** ION Publishing, Athens (In Greek), ISBN 960-411-336-4.

8. MITSIOS, I. K. (2001): **Soil science.** ZYMEL Publishing, Athens (In Greek), ISBN 960-7116-18-6.

9. PASCHALIDIS CHR. (2005): **Soil science – Laboratory exercises.** Embryo Publishing, Athens (In Greek), ISBN 960-8002-38-9.

Foreign:

10. GLADSTONES, J. (2000): **"Viticulture and Environment",** Winetitles Australia, ISBN: 1875130128

11. ASHMAN M. R., PURI G. (2002): **«Essential Soil Science: A Clear and Concise Introduction to Soil Science».** Blackwell Publishing, ISBN 0632048859, 9780632048854.

12. HARPSTEAD M. I., SAUER T. J., BENNETT W. F (2001): « **Soil Science Simplified** » Blackwell Publishing, ISBN 0813829429, 9780813829425.

COURSE SYLLABUS

COURSE TITLE:	**Special Winemaking Techniques/Technologies**
COURSE CODE:	**TO-52**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**5 (Theory 3, Laboratory 2)**
COURSE CREDITS:	**6,0**
STANDARD ACADEMIC SEMESTER:	**5th**

AIM AND OBJECTIVES OF THE COURSE

An analytical and in-depth presentation of all special winemaking types that oenologists must be familiar with. The various techniques developed in Greece, as well as in the other wine-producing countries, are analyzed. Students will learn selection criteria for the most suitable technique in each case.

COURSE SYLLABUS

Theoretical Part of the Course

- Production of Red Wines. General concepts. Mechanical processing of raw material. Various types of winemaking and corresponding winery equipment. Guided alcoholic fermentation. Guiding extraction. Extraction interruption and pressing of grapes. Guided malolactic fermentation.
- Winemaking in a carbon dioxide atmosphere. Intracellular fermentation.
- Thermal wine making.
- Continuous wine making.
- Production of Rosé wines.
- Production of sweet white wines from grapes subject to *Noble rot* (Sauternes, Tokay)
- Champagnes and sparkling wines. Traditional Champagnoise method, cuve close method, "transfer" method, continuous method, Asti Spumante.
- Winemaking of *Vin de Liqueur* and other naturally sweet wines. (Vinsanto, Samos, Mavrodaphne, Ice wein, etc.)
- *Xeres-type* winemaking.
- *Porto-type* winemaking.

Laboratory Part of the Course

Exercise 1	Winemaking in CO_2 atmosphere (Intracellular fermentation).
Exercise 2	Total Phenol Index (Methods: Permanganate, Folin-Ciocalteau, and Ultraviolet-visible Spectrophotometry.
Exercise 3	Determination of Color Intensity & Color Tone (I). Effect of pH & and SO_2 on the color characteristics of wines.
Exercise 4	Determination of Color Intensity & Color Tone (I). "Real Color".
Exercise 5	Assessing raw material color characteristics.
Exercise 6	Assessing raw material extraction capacities.
Exercise 7	Complete Anthocyanins.
Exercise 8	Complete Tannins.
Exercise 9	Polymerization Index (HCl), Ionization Index, Ethanol Index.
Exercise 10	PVPP Index.
Exercise 11	Determination of L-Malic acid.
Exercise 12	Sparkling Wine production using the Champagnoise method.
Exercise 13	Certification of wines from *V.riparia* & *V.rupestris hybrids.*

EXPECTED LEARNING OUTCOMES

1. The full familiarization of students with all special winemaking types.
2. Students will develop flexible thinking with regard to the various solutions & choices offered, which permit handling of the same raw material in a variety of ways in order to produce distinct & different wine products as appropriate to the case.
3. Together with theoretical education students will develop the necessary skills to handle the special equipment required in each case.
4. Students will be able to design a fully equipped, operational & ergonomically efficient winery, depending on the type(s) of wine they intend to produce.

BIBLIOGRAPHICAL REFERENCES:

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2. Evaggelos Soufleros. "Oenology. Science and expertise - T 2" (In Greek). Copyright © 1997. ISBN : 960 9699 1 6 , Set : 960 699 2 4
3. Argiris Tsakiris. "Oenology. From grape to wine". Psichalos Publishing. Athens 1998 (In Greek). ISBN: 960 7920 05 8.

COURSE SYLLABUS

COURSE TITLE:	**Introduction to Wine & Beverage Technology**
COURSE CODE:	**TO-15**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**2 (Theory 2)**
COURSE CREDITS:	**3,5**
STANDARD ACADEMIC SEMESTER:	**1st**

AIM AND OBJECTIVES OF THE COURSE

The course aims to provide students with the basic knowledge to identify and treat raw materials (grape distillates), as well as basic knowledge in wine technology for production of wines (white and red) and other spirits.

COURSE SYLLABUS

Theoretical Part of the Course

- Wine and health – Medical facts and reports regarding the consumption of alcohol and other ingredients contained in wines and beverages.
- Historical facts and references to wine from ancient times to the present day – facts relating to the technological evolution of wines and other beverages.
- Greek and foreign grape varieties for the production of various types of wines and distillates.
- Composition of grapes – Breakdown of constituents and their use in winemaking.
- Basic mechanical equipment of wineries. Potential for optimum utilization of equipment in production and the mixing of quality characteristics of different varieties.
- Basic equipment of Oenology laboratories for the quality control of wines and distillates - Basic oenological interventions.
- Introduction to the process of producing dry and sweet red wines, distillates and beverages.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

1. Be familiar with the basic concepts in Oenology and be able to recognize the composition of various types of wines, as well as the origin of the variety,
2. Understand the composition of grapes and distillates in order to produce various products,
3. Be familiar with the Greek and foreign grape varieties, so as to better utilize them in the production of various products,
4. Be able to identify the basic equipment of Wineries and to understand its main functions,
5. Have acquired basic knowledge of Oenological Analysis and Oenology interventions,
6. Be familiar with the basic technology of production of red and white wines and other spirits,
7. Be prepared to implement and adapt his/her applied oenological training.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Zagianari, I. 1949. Winemaking, Athens (In Greek).
2. Zabela, D. 1979. Methods for Food Analysis (In Greek).
3. Davidis, O.X. Greek Ampelography, Volume 3rd, Athens 1982 (In Greek).

Foreign:

4. Allen, W.H, 1961. A history of wine. Horizon Presse
5. Amerine, M.A and Singleton, V.L. 1965. Wine. University of California Press.
6. Amerine, M.A and Joslyn, M.A. 1970. Table Wines University of California Press.
7. Amerine, M.A and Kunkee, R.E 1968. Microbiology of Winemaking. University of California Press.
8. Amerine, M.A and Ough, C.S. 1974. Wine and Must Analysis. John Wiley and Sons.
9. Amerine, M.A and Kunkee, R.E., Ough, C.S., Singleton V.L., Webb, A.D. 1980. The Technology of Winemaking. A.V.I. Publishing Co.
10. Amerine, M.A and Roessler, E.B. 1983. Wines. Their Sensory Evaluation. Freeman, W.H. and Co, N.Y.
11. Beelman, R.B. and Gallander, J.F. 1979. Wine deacidification, Advances in Food Research, 25.
12. Benvegnin, L., Capt, E., Piquet, G. 1951. Traite de Vinification, Librairie Payot, Lausanne.

13. Garr, J.G., Cutting, C.V., Whiting, G.C. 1975. Lactic acid Bacteria in Beverages and Food, Academic Press.

14. Joslyn, M.A. and Amerine, M.A. 1964. Dessert, Appetizer and related Flavored Wines. University of California.

15. Jackisch, P. 1985. Modern Winemaking, Cornell University Press.

16. Lodder, 1970. The Yeasts. North-Holland Publishing Company.

17. Ribereau-Gayon, J., Peynaud, e. 1961. Traite d'cenologie, I, II, Librairie Polytechnique Ch. Beranger.

18. Rose, A.H. 1977. Alcoholic Beverages. Academic Press.

19. Schandorl, H. 1959. Die Microbiologie des Mostes und Weines, Eugen Ulmer, Stuttgart.

20. Vaughn, R.H. 1955. Bacterial Spoilage of Wines, Advances in Food Research.

21. The World Atlas of Wine. 1971. Mitchell Beasly. Ltd, London.

COURSE SYLLABUS

COURSE TITLE	**: Instrumental Chemical Analysis**
COURSE CODE	**: TO-51**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: CSS**
WEEKLY TEACHING HOURS	**: 6 (Theory 3, Laboratory 3)**
CREDITS	**: 6.5**
STANDARD ACADEMIC SEMESTER	**: E'**

AIM AND OBJECTIVE OF THE COURSE

1. The aim of the course is to familiarize students with the basic operating principles of instruments used in chemical analysis, simple applications thereof, as well as the characteristics and uses of the most common instruments, and evaluation of results.
2. For students to participate in simple experimental exercises in order to familiarize them with the instruments and devices used in an analytical laboratory, as well as to consolidate theoretical knowledge.

COURSE DESCRIPTION

Theoretical Part of the Course

Introduction to optical analytical methods. Spectroscopic and non-spectroscopic techniques. Techniques of measurement quantification (direct technique, reference curve technique, known addition technique, internal standard technique). Least squares method. Errors and significant digits. Limits to detection and determination (statistical analysis of results). Significance tests and quantitative tests in Instrumental Chemical Analysis. Classification of analytical techniques.

- Wine and beverage sampling and sample preparation prior to analysis.
- Analytical laboratories accreditation. Presentation of results and reliable analysis.
- UV-Vis Spectroscopy, organology and applications.
- FT-IR Spectroscopy, structure determination and chemical compounds identification, organology.

- Fluoroscopy, organology and applications.
- Atomic Spectroscopy: Flame Photometry.
- Atomic Spectroscopy: Atomic absorption Spectroscopy.
- Polarimetry, refractometry.
- Mass Spectroscopy (MS).
- Nuclear Magnetic Resonance Spectroscopy (NMR): organology and applications.
- Nephelometry- Turbidimetry.
- Introduction to chromatographic methods.
- Gas-Liquid Chromatography (GC).
- High Pressure Liquid Chromatography (HPLC).
- Introduction to methods of thermal analysis

Laboratory Part of the Course

The laboratory part of the course includes

- Vis spectroscopy: Detection of carbohydrates using a single beam spectrometer.
- UV Spectroscopy: Quinine determination in beverages using a double beam spectrometer
- UV Spectroscopy: Sorbic acid spectrum acquisition, selection of maximum wavelength and determination of acidity of a wine sample using a double beam spectrometer
- IR Spectroscopy: Structure determination and identification of chemical compounds Application in liquid samples
- IR Spectroscopy: Structure determination and identification of chemical compounds:

  Application in solid samples
- Fluoroscopy: Quinine determination in Tonic Water samples
- Fluoroscopy: Selenium determination in drinking water
- Polarimetry: Polarimetric determination of sugars
- Atomic Spectroscopy: Flame-photometric determination of potassium and sodium in wine
- Atomic Spectroscopy: Ca, Mg and Fe determination in wine with spectroscopy of atomic absorption
- Nephelometry – Turbidimetry: Turbidimetric determination of sulfuric anions in drinking and superficial water
- Gas-Liquid Chromatography: Separation and identification of alcohols and other volatile compounds in whiskey and other alcoholic beverages
- Gas-Liquid Chromatography: Sugars analysis

- High Pressure Liquid Chromatography (HPLC): Identification and quantitative determination of sugars in milk and dairy products with HPLC
- Chromatometry: Detection of phosphorus and phosphoric anions in must and wine

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Be familiar with basic analytical methods, be able to select the most suitable based on detection limitations, error recognition etc, and undertake simple applications thereof, as well understanding the particularities and uses of the commonest methods of analysis.
- Be able to interpret various spectrums, recognize typical IR bands, analyze and perform a structure-spectrum correlation.
- Be able to organize an analysis through selection of the appropriate method, taking into consideration relevant parameters (obstructions) and performing the necessary calculations.
- Comprehend basic concepts of spectroscopy, laws and apply them in chemical analyses,
- Comprehend the principles of sample preparation, protocol use, sampling methods, preservation of samples.
- Comprehend the concepts surrounding operation of an accredited analytical laboratory and learn the correct way to present results.
- Be familiar with thermal analysis and its applications, the various methods for separating mixtures (gas, liquids) due to different adsorption or distribution in solid or liquid phases; be familiar with the corresponding chromatographs and be able to identify different peaks.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. M.S. Bratakos, Instrumental Chemical Analysis in Food and Beverages Parts A' and B', T.E.I. of Athens 2003 (in Greek)
2. M.S. Bratakos, Laboratory Exercises of Instrumental Chemical Analysis in Food and Beverages Parts A' and B', T.E.I. of Athens 2001 (in Greek)
3. Chatzioannou, Th. P., Kalokerinos, A.K., Timotheou-Potamia, M, Quantitative Analysis. Athens (2000) (in Greek).
4. Chatzioannou, Th. and Kouparis, M., Instrumental Chemical Analysis. Athens (1990) (in Greek)

Foreign:

5. AOAC International (2002). Official Methods of Analysis. 17th Edition, (edited by W. Horwitz). AOAC International, Gaitherburg, MD.
6. Applications of thermal analysis to polymers, B. C. Loft, J. Polymer Sci. Symposium No 49, 127 -139 (1975)
7. Fundamental principles of polymeric materials, S.L. Rosen, 1982, John Wiley and sons
8. Thermal Characterization of Polymeric Materials, Edith A. Turi, 1981, Academic Press

COURSE SYLLABUS

COURSE TITLE:	**Waste Treatment**
COURSE CODE:	**TO-63**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**4 (Theory 2, Laboratory 2)**
COURSE CREDITS:	**4,5**
STANDARD ACADEMIC SEMESTER:	**6th**

AIM AND OBJECTIVES OF THE COURSE

The aim of course is for students to understand the operation of a wastewater treatment unit so that they are able to participate in its design, planning and operational control.

COURSE DESCRIPTION

Theoretical Part of the Course

1. Introductory concepts: Environment, ecosystem, ecological balance, pollution, contamination, waste, sewage, waste treatment etc. Phases of wastewater treatment and processes.
2. Physical, chemical and biological characteristics of wastewater: Color, odor, temperature, suspended solids. Dissolved solids and gases, acidity, alkalinity, nutrients and trace elements. Categories, types and activities of microorganisms.
3. Reactions and reactors: Chemical kinetics and balance, solubility of gases. Mass balance, plug-flow reactors, completely mixed flow reactors and arbitrary flow reactors, determination of reactor type, status of permanent diet.
4. Methods for assessing pollution load: Chemical oxygen demand, biochemical oxygen demand, aggregate carbon, aggregate organic carbon, aggregate oxygen demand, permanganate index.
5. Pollution of natural receptors: Pollution of streams, pollution zones, pollution of lakes. Eutrophication: causes, phases and countermeasures.
6. Primary treatment – I (Preliminary treatment and pre-treatment): Screening, desanding, fat collection, supply balancing, pH adjustment, mixing, flocculation and aggregation.
7. Primary treatment – II (Primary sedimentation): Types of sedimentation. Critical flow of solids. Types of sedimentation tanks. Characteristic features for the design of sedimentation tanks. Characteristics and standards for primary sedimentation tanks.
8. Secondary treatment – I (aerobic methods of suspended biomass – 1): Active mud systems and type variations, aerated lakes, characteristic values and design constants.

9. Secondary treatment – II (aerobic methods of suspended biomass – 2): Oxygen transfer phenomenon, aeration systems. Biological mud ecology, sedimentation problems and how they are handled, use of activated carbon.
10. Secondary treatment – III (aerobic methods of immobilized biomass): Biological filters, bio-towers, bio-discs, characteristic values and design constants.
11. Secondary treatment – IV (anaerobic treatment): Anaerobic digestion mechanism, anaerobic treatment in one or two phases, toxic substances and their handling, formation of anaerobic reactors and operational start-up.
12. Secondary treatment – V (secondary sedimentation and treatment of excess mud): Characteristics and standards for secondary sedimentation tanks. Thickening, aerobic/anaerobic/chemical/thermal stabilization, dehydration and drying of excess mud.
13. Tertiary and advanced treatment: Chemical nitrogen and phosphorus removal, biological nitrogen removal, simultaneous nitrogen and phosphorus removal, removal of dissolved substances. Decontamination: chemical and natural decontamination. Disposal of treated wastewater. Disposal of mud for use in agriculture.
14. Industrial wastewater treatment: Criteria for selecting treatment method, characteristics of wastewater from selected industrial categories and methods for treatment of wastewater therefrom.
15. Aspects of environmental legislation: Legislative framework under Law 1650/86 pertaining to the environment, project and activity categories, environmental conditions. Environmental impact study: environmental studies, content, submission, approval.

Laboratory Part of the Course

1. Physicochemical properties of wastewater.
2. Biological properties of wastewater.
3. Sample taking and sample processing.
4. Determination of complete, suspended, dissolved, volatile and non-volatile solids.
5. Determination of Chemical Oxygen Demand (COD).
6. Determination of Biochemical Oxygen Demand (BOD) - I (method principal, kinetics, measurement devices, grafting).
7. Determination of Biochemical Oxygen Demand (BOD) - II (BOD_5 and BOD_U, nitratification effect, correlations between BOD and COD).
8. Determination of alkalinity and permanganate index.
9. Determination of Total Carbon (TC), Total Organic Carbon (TOC) and Total Oxygen Demand (TOD).
10. Determination of nitrogen by means of the Kjeldahl method.
11. Volumetric and spectrophotometric determination of NH_4+ ions.
12. Spectrophotometric determination of NO_2^-, NO_3^-, PO_4^{3-}, Fe, Cl_2, phenols and surfactants.
13. Determination of oxygen transfer rate.
14. Determination of respiration rate and rate of consumption of active mud oxygen.
15. Determination of sedimentation rate, relative density and mud volume index.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

- Be familiar with and able to monitor the relevant processes, methodically solve most problems arising, carry out relevant laboratory analyses and determinations, apply the relevant legal framework and actively participate in the design and planning of small installations for wastewater treatment.

BIBLIOGRAPHICAL REFERENCES:

Greek:

12. S. Papakonstantinou "***Waste Treatment – Theory",*** Athens TEI 2005 (In Greek)
13. S. Papakonstantinou "***Waste Treatment – Laboratory",*** Athens TEI 2001 (In Greek)
14. G. Vavizos, K. Zannaki "***Ecological Theory and Practice in Environmental Studies»,*** Papazissi Publishing, 1998 (In Greek)
15. Tsonis "***Waste Treatment*** Papassotiriou Publishing, 2004 (In Greek)

Foreign:

4. B.E. Rittmann, P.L. McCarty ***"Environmental Biotechnology",*** McGraw-Hill 2001
5. R.L. Droste ***"Theory and Practice of Water and Wastewater Treatment",*** Wiley 1997
6. R. Moletta coord. ***"Gestion des problemes environnementaux dans les industries agroalimen-taires, 2nd ed."****, ed. Lavoisier 2006*
7. F. Jourjon, Y. Racault, J. Rochard ***"Effluent Vinicoles",*** Ed. Feret 2001
8. *A.P.H.A., A.W.W.A.,W.P.C.F.* ***«Standard Methods for the Examination of Water and Wastewater,17th ed.»,*** *W.E.F. 1989*

COURSE SYLLABUS

COURSE TITLE:	**Applied Mathematics and Statistics**
COURSE CODE:	**TO-12**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**Course of General Structure (CGS)**
WEEKLY TEACHING HOURS:	**3 (Theory)**
COURSE CREDITS:	**3,5**
STANDARD ACADEMIC SEMESTER:	**1st**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand the definitions of basic mathematic concepts relating to their curriculum, with reference to relevant theorems. They will understand the main concepts and content of descriptive statistics and implement the above in problems related to the specialization of the Department of Oenology and Beverage Technology.

COURSE DESCRIPTION

A. Applied Mathematics

Aspects of vector calculus: definition and properties of vectors, vector products, applications. Linear algebra: table definition, algebra tables, determinants, functions of real variables - definition, categories of function, periodic function, graphs. Limit values and analytic continuation of functions: definitions, main theorems, applications, function derivatives: definition, lateral derivatives, geometric significance, higher-order derivatives, differential of a function, differentiation rules, mean value theorems, applications in the study of functions, Taylor and Maclaurin formulas. Indefinite integrals: definition, integration rules, basic integration methods, approximate calculation using Taylor's formula. Definite integrals: definition, properties, mean value theorems, calculation of generalized integrals, applications in wine and beverage technology. Functions of multiple varieties: - definition, limit value, continuation, partial derivatives and main theorems, total differential, concept of vector function, applications. Differential equations – definition, aspects, form and categories of differential equations, first-order differential equations with constant coefficients.

B. Descriptive Statistics

Concept, content and application field of Statistics. Data types: quantitative data (ratio scale, interval scale), ranked data (ranking scale), categorical (quality) data (nominal scale), Sources of statistical data (National Statistical Service of Greece, Eurostat, Internet, etc.). Data collection methods: inventories, sampling researches, types of sampling research (simple random sampling, systematic random sampling, stratified random sampling, multi-phase sampling, percentage sampling). Methods of statistical data presentation: tables, table of frequency allocations, charts (timetables, bar charts, pie charts, histograms, box & whisker plots, scatter diagrams, characteristics of numerical data and methods of calculation, central tendency (arithmetic mean, geometric mean), points (median, quartiles, maximum frequency point), dispersion (range, inter-quartile range, fluctuations, standard deviation, variation coefficients), dissymmetry, correlation between two coefficients (correlation coefficient). Introductory concepts in the distribution of random coefficients (normal distribution, binomial distribution, Poisson distribution). Introductory concepts in the analysis of chronological orders: time series smoothing (moving average method), linear tendency equation, exponential tendency equation (average rate of change). Index numbers: price, volume and value indices, simple (individual) indices, weighted indices, fixed base indices, correlation of different base indices to an index with a single base period, value deflation.

EXPECTED LEARNING OUTCOMES

After completion of the course students will:

1. Understand and be able to utilize mathematical dimensions in problems of their specialization within the rest of the curriculum.
2. Be able to use statistical tools to understand and process issues in the wine-growing sector.

BIBLIOGRAPHICAL REFERENCES:

Greek:

A. Applied Mathematics

1. Bratsou, A., Higher Mathematics, A. Stamouli Publishing, Athens 2003 (In Greek), ISBN 9603514535.
2. Thomas, G. and Russel, I., Infinitesimal Calculus 1-11, University Publications of Crete, 2004, ISBN 9605241838 - 9605241846.
3. Murray R. Spiegel, Higher Mathematics, Schaum's Outline Series, ESPI Publishing, Athens 1982, ISBN 070602298.
4. Frank Ayres, Jr., General Mathematics, Schaum's Outline Series, ESPI Publishing, Athens 1983, ISBN 0700226531.

B. Descriptive Statistics

1. Chalikias, I., Statistics: Analysis Methods for Business Resolutions, Rosili Publishing Athens 2003 (In Greek).
2. Kondilis, E., Statistical Business Management Techniques, Interbooks Publishing, Athens 2000 (In Greek).
3. Tsibos, K. and Georgiakodis, F., Descriptive and Exploratory Statistics: Data Analysis, Volume I & Volume 11, Stamouli Publishing, Athens 1999 (In Greek)
4. Zairis P., Statistical Methodology, Volume A, Kritiki Publishing, Athens 2005 (In Greek).

Foreign:

A. Applied Mathematics

B. Descriptive Statistics

1. Berenson, M. Levine, D. and Krehbiel, T., Basic Business Statistics: Concepts and Applications, Tenth Edition. Prentice-Hall lnc., New York: 2006. .

COURSE SYLLABUS

COURSE TITLE:	**Applied Enzymology**
COURSE CODE:	**TO-EY3**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**SC**
WEEKLY TEACHING HOURS:	**2 (Theory)**
CREDITS:	**3.5**
STANDARD ACADEMIC SEMESTER:	**F'**

AIM AND OBJECTIVE OF THE COURSE:

After the completion of the course, students are expected to:

3. Have learned the basic principles of Enzymology and primarily to comprehend the structure of macromolecules and the properties of their derivative enzymes. In addition, they should understand biological catalysis.
4. Know the basic principles governing Biocatalysis.
5. Be able to explain physical constants and chemical behaviors of compounds based on their kinetic properties
6. Comprehend the basic difference between thermodynamic balance and enzymic catalysis.
7. Be able to apply chemical analysis techniques in the study of enzyme kinetics.
8. Evaluate the action of enzymes in vivo and in vitro.
9. Be able to design purification and isolation protocols for enzymes from plant and microbial sources.
10. Apply techniques of enzymic technology to optimize wine production.
11. Know the basic categories of enzyme and predict their chemical behavior, combine and apply the knowledge in oenological practices.

COURSE DESCRIPTION

1. Description of enzymes. Structure of enzymes.
2. Purification and isolation of enzymes.
3. Introduction to the concept of enzyme activity. Description of active centers in enzymes and modes of action. Effect of natural and chemical factors on the level of activity of enzymes.
4. Basic enzymes of saccharomyces and their action. Basic enzymes in grape maturation.

5. The concept of chemical catalysis. Kinetics of reactions. Measurement of chemical reaction rates. Kinetic constants of enzymes Vmax, Km.
6. Reversible and non-reversible enzyme inhibitors. Measurement of inhibitor action.
7. Isolation and purification of enzymes from different sources.
8. Enzymes in vivo. Allosteric phenomena.
9. Applications of enzymes. Industrial enzymes and applications of industrial enzymes.
10. Use of enzymes in winemaking. Clarification of wines. Development of aromatic flavour in wine.

EXPECTED LEARNING OUTCOMES

Final written exam for the theoretical part of the course.

BIBLIOGRAPHY

Greek:

5. BIOCHEMISTRY, Lubert Stryer, 1991 Crete University Press ISBN 960-7309-62-6 (in Greek)
6. I.G. Georgatsos, “Biochemistry”. Volume A’ – 6th Edition, Giachoudi-Giapouli Publications, Thessaloniki 1989 (in Greek)
7. I.G. Georgatsos, T.A. Gioupsani, D.A. Kyriakides, "Enzymology" Ziti Publications, Thessaloniki 2001 (in Greek).
8. Antonis Trakatellis, “Biochemistry, Enzymes – Volume B1” (in Greek)

Foreign:

1. Alan Fersht, "Enzyme Structure and Mechanism", 2nd Edition, W.H. Freeman

COURSE SYLLABUS

COURSE TITLE:	**Applied Informatics**
COURSE CODE:	**TO-13**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Course of General Structure (CGS)**
WEEKLY TEACHING HOURS:	**4 (Theory 2, Laboratory 2)**
COURSE CREDITS:	**4,0**
STANDARD ACADEMIC SEMESTER:	**1st**

AIM AND OBJECTIVES OF THE COURSE

1. The course aims to introduce students to the basic principles of informatics; students will develop skills in the preparation of essays and presentations.
2. The course aims to familiarize students with the use and creation of graphs, tables, functions and formulas to facilitate their research work and their professional work in the future.

COURSE DESCRIPTION

- Introduction and historical overview (Types of computers. Data processors. Computer Software. Background. Mechanical calculating machines (before 1930). Emergence of computers (1930-1950). Generations of computers (1950-to date)).
- Introduction and historical overview (Types of computers. Data processors. Computer Software. Background. (before 1930, 1930-1950 and 1950 – to date)).
- Introduction to the Windows operating environment (Computer modules. Login-Logout processes and change of password. Windows Operating Environment. Exploring Windows (Windows Explorer). File management. Windows updates. Writing data on a floppy disk or a usb stick and compressing files (WinZip).
- Introduction to Windows tools (Names and types of files. Help System. Installing-uninstalling programs. Installation of new devices)
- Web Internet (History of the Internet. Definition of a network. Network categories. Definition of the Internet. Definition of Client/Server. Network protocols. IP addresses, domain name, dns correspondence. Internet services. Concepts of Hypertext, Links and URL. Internet Explorer.
- Microsoft Word: Start up and settings. Creating, editing, viewing and exploring a document

- Document formatting. Working with text. Creating a table of contents
- Working with graphics and graphs. Printing. Security and privacy.
- Sending group mail. Sharing information. Computerization of tasks and program capabilities.
- Microsoft Excel: Start up and settings. Printing. Workbooks and Worksheets.
- Working with data (insert, select, edit, copy and transfer, filtering and classification)
- Using lists. Inserting data. Editing cells. Confirming entries in cells.
- Data analysis. Forms. Formulas (e.g. mathematic, statistical functions). Reference to functions.
- Graphs and diagrams. Tables. Smart tags. Working with XML
- Security and privacy. Computerization of tasks and program capabilities.
- Microsoft PowerPoint: Start up and settings. Creating a presentation
- Working with graphics and graphs. Building movement and inserting images
- Carrying out a presentation. Pack and go.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

- Be familiar with the basic functions of a computer
- Be able to format text
- Be able to write a paper and create a table of contents using a computer
- Be able to insert symbols, images or graphs in a text
- Be able to send group mail
- Be able to work with Workbooks and Worksheets.
- Be able to use databases, i.e. copy, transfer, filter and classify data.
- Be able to format cells
- Be able to analyze data, and use or create forms and formulas.
- Be able to create and manage graphs
- Be able to create a presentation using PowerPoint

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Karolidis, D.& Xarchakos, K., Microsoft Office Excel 2003, Avakas Publishing (In Greek)
2. Kilias, Chr., Kalafatoudis,Str. & Antonakopoulos, K., (2000) Using a Computer. Athens Neon Technologion Publishing (In Greek)
3. Microsoft Office PowerPoint
4. RAM the ultimate manual for Microsoft Office Excel 2003 Lambrakis Press S.A. Publishing (In Greek)
5. RAM the ultimate manual for Microsoft Office Excel 2007 Lambrakis Press S.A. Publishing (In Greek)

Foreign:

13. Connolly, Thomas, Begg, Carolyn E. (2008) A Practical Approach to the design, execution and management of database systems, Giourdas, M
14. Curtis Frye (2003) Microsoft® Office Excel® 2003 Step by Step
15. Joyce Cox, Curtis Frye, Steve Lambert, Joan Preppernau, et al (2008) 2007 Microsoft® Office System Step by Step, Second Edition
16. Patterson, D. & Hennessy, J. (2006) Organization and Design of Computers, Volumes 1 & 2 Athens. Pub. Kleidarithmos
17. Willard Kinkoph, Sherry (2008) Teach Yourself Visually: Microsoft Office 2007 Pub. Kleidarithmos

COURSE SYLLABUS

COURSE TITLE:	**Vine Culture**
COURSE CODE:	**TO-43**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**4 (Theory 2, Laboratory 2)**
COURSE CREDITS:	**4,0**
STANDARD ACADEMIC SEMESTER:	**4th**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to acquire the necessary knowledge for the establishment, cultivation and maintenance of a vineyard, such that they are able to cultivate vines in various ecosystems, and at the same time apply the most suitable cultivation pattern according to grape variety and soil-climate environment, in order to successfully achieve high-quality production.

COURSE DESCRIPTION

Theoretical Part of the Course

- **Establishing a productive vineyard and mother plantation:**
  - Ground redevelopment and landscaping, basic fertilizing.
  - Planting direction and distances.
  - Criteria for selecting varieties and mother vines.
  - Staking materials.
- **Vine formation:**
  - Patterns of cultivation (goblet – linear) and fruit-bearing capacity of vines in various climatological environments.
  - Principles and methodology of winter pruning.
  - Green pruning (topping, debudding, leaf removal, girdling, cluster thinning, application of plant-regulating substances).
- **Vine propagation:**
  - Methods for producing propagation material.
  - Certified vine-growing propagation material.
  - Micropropagation and tissue-culture.
- **Cultivation tasks and techniques:**
  - Soil cultivation.

- Mechanical systems for soil care.
- Competitive crops and weeds.
- Biotechnical systems for the elimination of weeds.
- Vineyard irrigation systems.
- Vineyard fertilizing (inorganic, organic, green).
- Mechanized foliar, spraying and harvesting tasks.

Laboratory Part of the Course

- **Grafting methods:**
  - Spring grafting
  - Summer cleft grafting
  - Autumn cleft grafting
- **Winter pruning:**
  - Formation pruning
  - Bearing pruning
  - Formation and bearing patterns
  - Goblet patterns
  - Linear patterns
    - Guyot linear pattern
    - Royat linear pattern
- **Sumer pruning:**
  - Debudding
  - Topping
  - Cluster thinning
  - Leaf removal
- **Visits to vineyards and small mother plantations where propagation material is produced.**

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

1. Be familiar with the principles regulating the establishment of a vineyard and be able to carry out vine cultivation in various ecosystems.
2. Be familiar with the various cultivation and fruit-bearing patterns in order to make selection of the most suitable, based on the grape variety, the soil-climate environment and the destination of the produced product.

3. Be familiar with the cultivation tasks and techniques which must be implemented in a vineyard, in order to optimize quality of the grapes produced.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. HOFMANN U., KOPFER P., WERNER A. (2003): **Viticulture – organic farming.** PSICHALOS Publishing, Athens (In Greek), ISBN 9608336104.

Foreign:

2. COOMBE, B., DRY, P. (2000): **Viticulture - Volume 2 Practices.** Adelaide: Winetitles, Australia, ISBN 1875130020.
3. MUELLER, E., SCHULZE, G., WALG, O. (2000): **Weinbau.** Fachverlag Dr. Fraund, Mainz, ISBN 3921156424.
4. JACKSON, R. S. JACKSON, R. S. (2000): **Wine Science: Principles, Practice, Perception.** San Diego: Academic Press, ISBN 012379062x.
5. VOGT, E. SCHRUFT, G. (2000): **Weinbau.** Ulmer Verlag, Stuttgart, ISBN 3800157209.
6. KADISCH, E. MUELLER, E. (1999): **Der Winzer, Band.1, Weinbau.** Ulmer Verlag, Stuttgart. ISBN 3800112167.

COURSE SYLLABUS

COURSE TITLE:	**: Wine and Beverages Marketing**
COURSE CODE:	**: TO-72**
COURSE TYPE:	**: Theoretical**
COURSE CATEGORY:	**: MELH**
WEEKLY TEACHING HOURS:	**: 3 (Theory 3)**
COURSE CREDITS:	**: 4,0**
STANDARD ACADEMIC SEMESTER:	**: 7th**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand basic marketing concepts, with an emphasis on issues in the wine-growing sector and wine and beverages companies, as well as interrelated activities in the fields of tourism, culture, environment-quality of life, gastronomy and well being. Students are familiarized with marketing techniques and practical applications necessary for a competitive view of the wine-growing sector and the efficiency of wine and beverages companies. Students will also acquire skills in selected marketing techniques.

COURSE SYLLABUS

Theoretical Part of the Course

The concept and development of marketing. Introduction to wine and beverages Marketing. Marketing research methods. The Business, the Marketing system and the environment. The viticulture sector, production and commercial trade of wines and beverages. Marketing functions (purchasing and sales, transportation, treatment – processing, warehousing, standardization, packaging, financing, risk taking, market information and research, communication projection and promotion). Behavior of buyers-consumers. Market segmentation. Product strategy. Pricing strategy. Distribution. Marketing programming and budgeting. EU policy on wine and beverages Marketing. Special problems in Wine and Beverages Marketing. Marketing and new technologies. Special wine and beverages marketing issues – interrelated activities in the fields of cultural dietary habits, tourism and local development. Case study.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will be able to:

- incorporate marketing aspects and handle issues relating to the wine-growing sector and the businesses that engage in this sector either directly or indirectly.
- actively participate in the preparation of marketing plans for the wine-growing sector, as well as of relevant research studies for wine and beverages businesses and any interrelated activities.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Kaldis P., Nanos I., Spathis P., Tachopoulos P. and Tsimpoukas K., Modern Agricultural Businesses, Book for the 2nd Cycle of Technical Vocational Education Centers, Sector of Agricultural Science, Food and Environment, All Specialties, Published by the Educational Institute – Organization for the Publishing of Educational Books (OEDB), Athens, 2005 (In Greek).
2. Blythe, J. Introduction to Marketing, Second English Edition, Kleidarithmos Publishing, Athens, 2002.
3. Kotler, P. and Kelle, K.L., Marketing Management, Kleidarithmos Publishing, Athens, 2006.

Foreign:

1. Lapsley, J. and Moulton, K., Successful Wine Marketing, Springer Science and Business Media, Inc. 2001.
2. Wagner, P., Olsen, J. and Thach, L., Wine Marketing and Sales, The Wine Appreciation Guild, USA, 2007.
3. Hall, M. and Mitchell, R., Wine Marketing: A Practical Guide, Elsevier Ltd, 2008.
4. Kotler, P., and Armstrong, G., Principles of Marketing, Pearson Education, 2007.
5. Burkitt, H. and Zeallen, J., Marketing Excellence, John Willey and Sons Ltd, 2006.
6. Pride, W. and Ferrell, O., Marketing, Houghton Mifflin Co, 2007.
7. Haines, M. Marketing for Farm and Rural Enterprise, Farming Press, Ipswitch, UK, 1999.
8. Lee J., Leising, J. and Lawver, D., AgriMarketing Technology, Interstate Publishers, Inc., Danville, Illinois, USA, 1994.
9. Padberg, D. et al. (eds.) Agro-Food Marketing, CAB International, Wallingford, UK, 1997.

COURSE SYLLABUS

COURSE TITLE	**: Wine Microbiology**
COURSE CODE	**: TO-41**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS	**: 6 (Theory 3, Laboratory 3)**
COURSE CREDITS	**: 7,5**
STANDARD ACADEMIC SEMESTER	**: 4th**

AIM AND OBJECTIVES OF THE COURSE

The aim of the theoretical part of the course is for students to understand the properties of microorganisms involved in alcoholic fermentation, wine spoilage, and the alcoholic fermentation process.

The laboratory part of the course aims to familiarize students with the application of microbiological methods in cultures and the exploration of the properties of microorganisms involved in alcoholic fermentation and wine spoilage.

COURSE SYLLABUS

Theoretical Part of the Course

- Yeasts in general. Various yeast kinds.
- Yeast development during alcoholic fermentation.
- Alcoholic fermentation. By-products of alcoholic fermentation.
- Factors affecting alcoholic fermentation.
- Sulphur metabolism in yeasts.
- Killer yeasts.
- Spontaneous and controlled fermentation.
- Production of Sherry-type wines.
- Lactic bacteria and lactic fermentation.
- Malolactic fermentation.
- Microbial deterioration of wines. Deterioration from yeasts, lactic bacteria and acetic bacteria.
- Thread-like fungi. Effects of the Botrytis cinerea fungus.

Laboratory Part of the Course

The laboratory part of the course is comprised of practical exercises to isolate microorganisms from must and wines, determination of population and fermentation properties of microorganisms, as well as exercises in their identification and the microbiological control of wines.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

- Be able to recognize the microorganisms which are instrumental in alcoholic fermentation or lead to wine spoilage.
- Be familiar with the biochemical capabilities and biological characteristics of these microorganisms.
- Be familiar with the factors affecting alcoholic fermentation.
- Be able to use microbiological methods for the isolation, cultivation, identification and determination of the biochemical capabilities of must and wine microorganisms.
- Be able to perform microbiological testing of musts and wines.

BIBLIOGRAPHICAL REFERENCES:

Foreign:

1. H.H.Dittrich, M. Grossmann : Mikrobiologie des Weines. Ulmer Verlag (2005).
2. G.H.Fleet (ed.): Wine Microbiology and Biotechnology. Harwood Academic Publishers (1993)
3. L.Usseglio-Tomasset : Chimie oenologique. Technique et Documentation-Lavoisier (1995).
4. K.C.Fugelsang: Wine Microbiology. Chapman & Hall (1997)
5. A.H.Rose & J.S.Harrison (ed.). The Yeasts Vol. 1-5. Academic Publishers (1993).
6. P.Ribereau-Gayon, D. Dubourdieu, B. Doneche, A. Lonvaud: Handbook of Enology, Vol. 1, Vol. 2. Wiley (2006)

COURSE SYLLABUS

COURSE TITLE	**Morphology - Physiology of Vine**
COURSE CODE	**TO-25**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS	**: 4 (Theory 2, Laboratory 2)**
COURSE CREDITS	**: 4,0**
STANDARD ACADEMIC SEMESTER	**: 2nd**

AIM AND OBJECTIVES OF THE COURSE

The course aims to familiarize the students with the functions of growth and development in the vine and enable them to connect these to the morphological - anatomical characteristics of vegetative reproductive organs. Particular emphasis is placed on the basic principles of vine metabolism and plant reaction to the various biotic and abiotic factors. Graduates will accordingly be able to assess vine needs based on currently prevailing environmental conditions, with the purpose of optimizing the quality of the grape and the wine produced.

COURSE SYLLABUS

Theoretical Part of the Course

- Phenological growing phases of the vine.
- Morphology and anatomy of growing and breeding organs (root, shoot, leaves, flower, berry, grape seeds) and their evolution during the growing period (annual growth cycle).
- Morphology and anatomy of berries.
- Growth physiology of the vine growing organs and external factors affecting growth processes (relation to light, temperature, and water).
- Growth physiology of the breeding organs (effect of plant hormones, environment and nutrition on the various flower growing phases).

- Fruit setting, growth and maturation of berries (internal and external factors affecting the various growth phases, maturation physiology and biochemistry with an emphasis on grape composition development).
- Water management of the vine (study of normal water adsorption and transpiration processes, as well as effects of water stress on the growth and quality of the grapes produced).
- Factors affecting photosynthesis and vine respiration and how they are involved in the formation and metabolism of sugars.
- Inorganic nutrition in vines: Vine requirements for inorganic macro and micro nutrients and nutrition – quality/quantity correlation.
- Abiotic stress factors of the vine.

The laboratory part of the course will comprise the following units:

- Primary & secondary anatomy of the shoot.
- Morphological & anatomical characteristics of the leaf.
- Morphology & anatomy of the root.
- Morphology & anatomy of the breeding organs (flowers, berries, grape seeds).
- In vitro culture as a system for studying vine physiology (development of axillary vine buds into shoots and their rooting).
- Photosynthesis – Photosynthetic leaf pigments (measurement of anthocyanins, analysis of photosynthetic and photo-protective leaf pigments, measurement of photosynthesis and relevant parameters).
- Transpiration (study of the parameters on which transpiration, transpiration rate of leaves and conductivity of stomata depend).
- Respiration (study of the respiration function in vine leaves and determination of the respiratory quotient).
- Storage of polysaccharides (determination of starch in roots and vine leaves of different ages – position in the shoot).
- Determination of total nitrogen content (determination of total nitrogen content in vine leaves of different ages).
- Grape maturation phases.
- Methods for isolating and analyzing vine genes.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

- Be familiar with vine structure and functioning.
- Be able to evaluate the factors guiding and affecting the development of growth and breeding organs and consequently of production.
- Be able to assess vine needs in currently prevailing environmental conditions with the purpose of optimizing production (on a quantity / quality basis).

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. AIVALAKIS, G., KARABOURNIOTIS, G., FASSEAS, K., General botany: Morphology, anatomy and physiology of higher plants, Embryo Publishing (In Greek). 2005
2. GALATIS, B., GANOTAKIS, D., GANI – SPIROPOULOU, K., KARABOURNIOTIS, G., KOTZAMPASSIS, K., KONSTANTINIDOU, E. I., MANETAS, I., ROUMPELAKI - AGGELAKI, KALLIOPI A. Plant Physiology: From molecule to environment, University Publications of Crete (In Greek). 2003
3. Kourtidou – Tympa P. Notes on Vine Morphology and Physiology, Athens TEI (In Greek). 1977
4. Kourtidou – Tympa P. Laboratory Notes on Vine Morphology and Physiology Athens TEI (In Greek). 1977

Foreign:

1. BOULTON, R.B. et al. Principles and practices of winemaking, The Chapman & Hall Enology Library. Chapman & Hall. 1996
2. DICKINSON W.C. Integrative plant anatomy. San Diego: Academic Press. 2000
3. HOLBROOK N.M., ZWIENIECKI M.A. Vascular transport in plants. Burlington, CA: Academic Press. 2005
4. HUGLIN, P., SCHNEIDER, CHR. Biologie et ecologie de la vigne. Tech.& Doc., Lavoisier. 1998
5. MAY, P. Flowering and Fruitset in Grapevines. Lythrum Press, South Australia. 2005
6. MULLINS, M.G., BOUQUET, A., WILLIAMS, L. E. The Biology of the Grapevine. Cambridge Univ. Press. 1992
7. ROUBELAKIS-ANGELAKIS, K. A. Molecular Biology & Biotechnology of the Grapevine. Kluwer Academic Pub., 2001
8. TAIZ, L., ZEIGER, E. Physiologie der Pflanzen. Spektrum Akademischer Verlag, Heidelberg. 2000
9. WEAVER, R.J. Grape Growing. John Wiley & Sons. 1976
10. WHITE, R.E. Soils for Fine Wines, Oxford University Press. 2003

COURSE SYLLABUS

COURSE TITLE:	**Wine and beverages legislation**
COURSE CODE:	**TO-73**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**MELH**
WEEKLY TEACHING HOURS:	**2 (Theory)**
CREDITS:	**3.5**
STANDARD ACADEMIC SEMESTER:	**G**

AIM AND OBJECTIVE OF THE COURSE

The aim of the course is to familiarize the student with:

- The basic principles of Food and Beverages Legislation which aims to protect consumers from adulteration, misrepresentation and primarily to protect their health.

- Institutional organization and administrative bodies in the European Union and their decision-making mechanisms.

COURSE DESCRIPTION

1. Formulation and Implementation of Legislation.
2. Checks and control mechanisms
3. Introduction to Community Law – Establishment and core values of the Community, Community Institutions
4. Community Law. Sources of Community Law, formulation of Community Legislation and its effect on legal order of State-Members
5. Regulation (EC) No.479/2008 on the common organization of the market in wine: Necessity for training, purpose and scope
6. Geographical status, geographical indications and traditional indications of wines and alcoholic beverages.
7. Sparkling and aerated wines
8. Liqueurs and flavored wines
9. Wine and beverage analysis methods
10. Enrichment, increase and decrease of acidity
11. Labeling – presentation of wines and grape must products
12. Alcoholic beverages – Definition, characterization
13. Conditions of production and consumption of alcoholic beverages
14. Beer legislation – Production, definition, laws and conditions of availability for consumption
15. Manufacturers' organizations and industry sector organizations

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will be familiar with:

- The basic principles of Food and Beverage Legislation
- Institutional organization and administrative bodies in the European Union and their decision-making mechanisms.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Andreas Combos – Introduction to Wines and Beverages Legislation T.E.I. of Athens, Faculty of Food Technology and Nutrition, Department of Oenology and Beverage Technology, Athens 1995
2. Regulation (EC) 479/2008 on the common organization of the market in wine 2008. *Official Journal of the European Union,* L148, page 1-61 (in Greek).
3. Kourakou-Dragona St., 1987. Greece of Wines, Organization for the Promotion of Exports, Athens (in Greek)
4. Kourakou-Dragona St., 1997 Wine choices *Trochalia Publication,* Athens (in Greek)

Foreign :

5. International Organization of Vine and Wine, 2005. *Compendium of International Methods of Wine and Must Analysis.* Volumes 1 and 2, OIV, Paris, France.
6. International Organization of Vine and Wine, 1994. *Compendium of International Methods of Analysis of spirited beverages, alcohol and beverage aromatic fraction.* Volumes 1 and 2, OIV, Paris, France.

COURSE SYLLABUS

COURSE TITLE:	**English/French for Specific Purposes**
COURSE CODE:	**TO-65**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**SC**
WEEKLY TEACHING HOURS:	**4 (Theory 4)**
CREDITS:	**7.5**
STANDARD ACADEMIC SEMESTER:	**F'**

AIM AND OBJECTIVE OF THE COURSE

1. The aim of the course is to enable students to develop skills in the understanding and use of the English language, to serve their communications and academic needs within the work environment of Oenology and Beverage Technology.

2. For students to recognize characteristic syntax and usage of English scientific language in their field and understand English bibliographic references in Oenology and Beverage Technology. In addition, for students to be able to attend or make oral presentations in issues related to their field, and participate in subsequent discussion and/or fluently compose a concise and/or extended written text, using the necessary scientific terminology of their field.

COURSE DESCRIPTION

The syllabus, which consists of 15 modules, includes a reader and supplementary material – theory and exercises - and various handouts.

In order to facilitate students, a recommended list of printed literature is provided, although the use of technological means – especially the internet, is a valuable teaching tool since it provides the opportunity to search and select multiple sources of information (article EI T News, May 2008, page. 14).

The evaluation of acquired knowledge is based on the final written exam, as well as on optional essays.

- Chapters from the student reader.
- The global history of wine
- Ancient cultures, Europe, USA, Australia

- The Grape
- The Wine Year in the Northern Hemisphere
- Wine types / wine styles
- The Art and Science of Wine
- Factors that influence the quality of wine
- How wine is made
- How to taste
- Storage, faults
- Service of wine
- Decanting
- Merchandising, food and wine matching
- Writing a Research paper

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Be familiar with and comprehend scientific English language in order to serve their communications and academic needs in an Oenological and Technological Environment.
- Be able to recognize and interpret characteristic syntax and word usage in English scientific language and understand the bibliographic literature.
- Be able to attend oral presentations and participate in subsequent discussions and will have learnt proper methods of presentation.
- Comprehend technological terms in Oenology and Beverage Technology and combine and use them in the foreign language to meet their professional needs.

BIBLIOGRAPHICAL REFERENCES:

Foreign:

16. Richard Vine, Ellen Harkness and Theresa Browning, Cheri Wagner, Winemaking (From grape growing to Marketplace) Chapman & Hall, ITP.
17. James Halliday and Hugh Johnson Tom Stevenson, The New Sotheby's Wine Encyclopedia
18. Kirszner and Mandell, (1989), The Holt handbook
19. Michael Hennessy, (1989), The Borzoi Practice Book for writers.
20. www.tasting-wine.com
21. www.wset.co.uk, wine and spirits

COURSE SYLLABUS

COURSE TITLE	**: Wine Tourism Management**
COURSE CODE	**: TO-EY2**
COURSE TYPE	**: Theoretical**
COURSE CATEGORY	**: MELH**
WEEKLY TEACHING HOURS	**: 2 (Theory 2)**
CREDITS	**: 3,5**
STANDARD ACADEMIC SEMESTER	**: 6**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand the basic concepts of wine tourism management, as well as the interrelated local activities, culture, environment – quality of life, gastronomy and well-being; to familiarize them with techniques and practical applications of wine tourism management, elements necessary for a competitive perspective of the wine sector and the local efficiency of wine and beverage companies; and to acquire skills with regard to selected management techniques.

COURSE SYLLABUS

Theoretical Part of the Course

Features of the organization of the economy and society in the agricultural sector. The sustainable development of the agricultural sector: conditions, possibilities and the importance of the primary sector. Local development, mobilization of local resources and multiple activities. Tourism and alternative tourism. Countryside tourism, agrotourism, local culture, traditional products and wine tourism. Special management and marketing issues in wine tourism businesses. Development of business plans in wine tourism management. Case study.

EXPECTED LEARNING OUTCOMES

After the completion of the course, the student will be able to:

- Introduce organizational and administrative dimensions of wine tourism at the level of wine sector businesses.
- Actively participate in the preparation of business plans for the organization and administration of wine tourism and similar businesses, technical and financial feasibility studies, as well as interrelated activities.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Kaldis, P., Theodoropoulou, E., Alexopoulos, C. and Giannouzakou, A., Agrotourism and Development. Book for the 2nd Class of the Technical and Vocational Schools, Sector of Agronomy, Food and Environment, Environment and Agrotourism Specialization, Pedagogic Institute Edition – School Book Publishing Organization, Athens, 1999 (In Greek).
2. Kaldis, P. And Giannouzakou, A., "Wine, Tourism and Consumer", Chapter of Book in Food and Consumer (K. Apostolopoulos, Editing), Editions Ellinoekdotiki, Athens 2008 (In Greek).

3. Kokkosis, C. and Tsartas, P., Sustainable Tourism Development and Environment, Editions Kritiki, Athens, 2001 (in Greek).
4. Mitoula, R., Astara, O. and Kaldis, P., Sustainable Development, Editions Rosili, Athens 2008 (In Greek).
5. Prahalad, C.K. and Ramaswamy, V., The Future of Competition, Editions Kleidarithmos, Athens, 2006 (In Greek).

Foreign:

6. Carl, J. and Charters, Global Wine Tourism, CABI, 2007.
7. Hall, M., Sharples, L., Cambourne, B. and Macionis, N., Wine Tourism around the World: Development, Management and Markets, Butterworth-Heinemmann, 2002.
8. Hall, M. and Sharples, L., Food and Wine Festivals and Events around the World: Development, Management and Markets, Butterworth-Heinemmann, 2008.
9. Lapsley, J. and Moulton, K., Successful Wine Marketing, Springer Science and Business Media, Inc. 2001.
10. Wagner, P., Olsen, J. and Thach, L., Wine Marketing and Sales, The Wine Appreciation Guild, USA, 2007.
11. Hall, M. and Mitchell, R., Wine Marketing: A Practical Guide, Elsevier Ltd, 2008.
12. Friend, G. and Zehle, S., Guide to Business Planning, The Economist in association with Profile Books Ltd, U.K., 2004.
13. Pine, J. and Gilmore, J., The Experience Economy, Harvard Business School Press, Boston, U.S.A., 1999.

COURSE SYLLABUS

COURSE TITLE:	**Organic Chemistry**
COURSE CODE:	**TO-21**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**CGS**
WEEKLY TEACHING HOURS:	**6 (Theory 3, Laboratory 3)**
CREDITS:	**7.5**
STANDARD ACADEMIC SEMESTER:	**B**

AIM AND OBJECTIVE OF THE COURSE

To teach students the basic principles of Organic Chemistry, primarily comprehension of the structure of molecules and derivative properties. In addition, students should understand the concept of new molecule formation with different properties than those of the reagents, and understand the concept of Organic Synthesis in general.

In the study of organic chemistry, it is necessary to extend examination to the molecular level in order to understand the physical and chemical properties of compounds, which are ultimately explained through understanding of their structure and the way in which molecules are connected. This module introduces some principles essential to the understanding of organic molecules.

COURSE DESCRIPTION

Theoretical Part of the Course

- Physical constants, Van der Waals force, boiling point, hydrogen bonds, solubility in water, intermolecular forces and physical properties.
- Bonds & Molecular structure
- Electronic theories and Molecular Structure
- Bonds & valences
- Stereoisomerism Part I and II and Optical Activity
- Organic reactions, Chemical Reaction, Reactants or substrate, Reagent, Product(s), Conditions of a reaction:
- Classification of Organic Reactions:
- Classification based on Structural Changes
- Classification based on Reaction Category
- Classification based on Reactive Group
- Organic Reactions parameters
- Factors affecting Reactions

- Mechanisms of Organic Reactions

Laboratory Part of the Course

- Alcohols
- Aldehydes
- Acids
- Esters
- Phenols
- Anthocyans
- Polyphenols
- Sugars
- Amino acids
- Peptides
- Fatty acids

EXPECTED LEARNING OUTCOMES

After the completion of the course, the student will:

- Know the basic principles of Organic chemical compounds.
- Be able to explain physical constants and chemical behavior of compounds based on their molecular structure.
- Comprehend the basic concepts of organic synthesis.
- Know the basic categories of Organic compounds and predict their chemical behavior, and combine and apply the knowledge in chemical analyses.
- Comprehend the principle of preparation of a chemical reaction, the calculation of quantities, the role of solvents, the role of the other compounds, monitoring of reaction rates etc.
- Be familiar with the formation of new compounds from others with different structures. Emphasis will be placed on reactions occurring in wine (esterifications, formation of acephalous, oxidation etc).
- Know the various methods for separating mixtures into in their component parts (gases, liquids) and delivery of pure compounds.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. N.E. Alexandrou (1992): General Organic Chemistry, Ziti Publications Thessaloniki (in Greek)
2. John Mc MURY (2001): Organic Chemistry, Crete University Press (in Greek).

Foreign:

3. Sebastien Fraigne (2005): Annales Bac 2005, Corriges, Chimie serie S, Editions Vuibert, Paris.

COURSE SYLLABUS

COURSE TITLE:	**Sensory Evaluation of Wine and Beverages**
COURSE CODE:	**TO-74**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**6 (Theory 3, Laboratory 3)**
CREDITS:	**6,5**
STANDARD ACADEMIC SEMESTER:	**7**

AIM AND OBJECTIVES OF THE COURSE

The aim is for students to be able to appreciate, describe and interpret the sensory characteristics of wines and other alcoholic beverages in order to be in a position to determine the effect of every factor on the procedure of its production and development.

COURSE SYLLABUS

Theoretical Part of the Course

1. IMPORTANCE OF SENSORY EVALUATION Consumers, Standardization, Commercial Trade, Competitiveness.

2. TYPES OF SENSORY TESTS Analytical (discrimination, descriptive), preference or acceptance. Descriptive analysis of wines.

3. EXPERIMENTAL PLANNING AND EXECUTION OF SENSORY TESTS. Aims-objective, testing environment, methods of presentation, glasses, samples, tasters.

4. THE SENSES IN THE ORGANOLEPTIC TESTING OF WINES AND BEVERAGES. Analysis of sensory evaluation in stages: Visual, olfactory and taste impressions.

5. COLOR AND APPEARANCE OF WINES. The role of visual impression. Influenced by: a) raw material; b) vinification technique, c) aging. Carbon dioxide. White, Red, Rosι. Sparkling and semi-sparkling wines.

6. WINE AROMA. Aroma - Bouquet. Glossary of the most popular terms for a) white and b) red wines. Origins of aromas.

7. FLAVORS AND AROMAS OF THE WINE MOUTH. Distinction of flavor – aroma of mouth – feeling of mouth – aftertaste. Glossary of the most popular terms for a) white and b) red wines. Origins of flavor characteristics.

8. FACTORS THAT AFFECT THE SENSORY CHARACTERISTICS OF WINES.

   Variety, place of origin, vintage, cultivation conditions, vinification techniques, aging.

9. GREEK WHITE WINES. The most representative Greek white varieties and their main sensory characteristics. Relationship of variety with place of origin.

10. GREEK RED WINES. The most representative Greek red varieties and their main sensory characteristics. Relationship of variety with place of origin.

11. INTRODUCTION TO THE EUROPEAN VINEYARD. France, Spain, Italy, Portugal, Germany. Representative varieties and places of cultivation.

12. INTRODUCTION TO THE GLOBAL VINEYARD. The “New World”: California, South Africa, Australia, New Zealand. Main cultivated varieties and sensory characteristics.

13. SENSORY TESTING OF DISTILLATES. Introduction to the sensory evaluation of

    distillates. Whiskey, Cognac, Tsipouro, Gin, Vodka.

14. SENSORY TESTING OF BEER. Introduction to the sensory evaluation of beer.

    Main types of beer. Ale and Lager beers.

15. PROCESSING AND INTERPRETATION OF SENSORY TESTING INFORMATION. Basic methods of statistical analysis of sensory testing results. Analysis of variance, multivariate analysis. The role of taster training.

Laboratory Part of the Course

1. IMPORTANCE OF SENSORY EVALUATION AND TYPES OF SENSORY TESTS:

   TRIANGULAR TESTING. Importance for the consumer, standardization, commercial trade. Detailed tests (Discrimination, Descriptive), preference tests. Importance of experimental design. The triangular test.

2. ANALYSIS OF SENSORY TESTING OF WINES AND BEVERAGES: OLFACTORY CHARACTER OF WINES. Descriptive analysis of wines: Basic principles. Visual impression, olfactory character and flavor character. Aroma - Bouquet. Explanation of olfactory characteristics of wines with standard samples and/or corresponding wines.

3. FLAVORS AND AROMAS OF THE WINE MOUTH. PART A: SWEET, SOUR, FRUITY etc. Basic Flavors. Discrimination of flavor – aroma of mouth. Familiarization with flavors: sweet, sour and certain mouth aromas, e.g.: fruity (solutions and/or corresponding wine samples).

4. FLAVORS AND AROMAS OF THE WINE MOUTH. PART B: BITTER, ASTRINGENT, WOODY, etc. Familiarization with the bitter taste, astringent sense of the mouth and the woody and other mouth aromas (solutions and/or corresponding wine samples). The importance of training for the taster.

5. DESCRIPTIVE ANALYSIS OF WHITE DRY WINES: GREEK VARIETIES. Total description (visual impression to aftertaste) of the most representative Greek varieties: Savvatiano, Roditis, Moschofilero, Assyrtiko, etc. Descriptive analysis with specific vocabulary and freely chosen vocabulary.

6. DESCRIPTIVE ANALYSIS OF WHITE DRY WINES: MAIN INTERNATIONAL VARIETIES. Introduction to the most representative international white varieties: Chardonnay, Sauvignon Blanc, Riesling, Gewurtztraminer, etc. Full description and main characteristics. Descriptive analysis with specific vocabulary and freely chosen vocabulary.

7. DESCRIPTIVE ANALYSIS OF RED DRY WINES: GREEK VARIETIES. Full

   description and main characteristics of Greek red varieties: Agiorgitiko, Xinomavro, Liatiko, Mandilaria, Krasato, etc. Descriptive analysis with specific vocabulary and freely chosen vocabulary.

8. DESCRIPTIVE ANALYSIS OF RED DRY WINES: MAIN INTERNATIONAL

   VARIETIES. Introduction to the most representative international red varieties: Cabernet Sauvignon, Syrah, Merlot, Pinot Noir. Full description and main characteristics. Descriptive analysis with specific vocabulary and freely chosen vocabulary.

9. SPARKLING AND ROSE WINES FROM GREECE AND THE WORLD. Places of origin, types, main sensory characteristics.

10. SWEET WINES FROM GREECE AND THE WORLD. Vinsanto, Port wine, Sherry, Madera wines. Methods of production and main sensory characteristics.

11. THE EFFECT OF THE SOIL, MICROCLIMATE, CULTIVATION CONDITIONS AND VINIFICATION ON THE SENSORY CHARACTER OF WINES. Effect of the above factors on the sensory characteristics of the same variety.

12. AGING WINES AND WINES WITH SPECIFIC FLAWS. The impact of aging on the sensory characteristics of the wine. Oxidized wines, wines with excessive volatile acidity, hydrogen sulphide, etc.

13. SENSORY TESTING OF DISTILLATES. Introduction to the sensory testing of distillates: Whiskey, Cognac, Tsipouro, Gin, Vodka.

14. SENSORY TESTING OF BEER. Introduction to the sensory testing of beer. Main types of beer: Lager and Ale.

15. STATISTICAL PROCESSING AND INTERPRETATION OF DATA. Introduction to the main statistical processes and correct interpretation of data from sensory evaluation experiments. Analysis of variance, multivariate analysis.

EXPECTED LEARNING OUTCOMES

After the completion of the course, the students will be able to:

1. Describe the sensory characteristics of wines
2. Interpret the sensory characteristics based on chemical composition.
3. Appreciate the results of each factor affecting quality and development during aging.
4. Based on the sensory evaluation, to be able to intervene at all stages of the production process of converting grapes into wine.
5. Estimate the commercial value of wine and have an informed opinion about the correct combination with the most suitable dishes.
6. Present wine for commercial purposes, in the form of text addressed to professionals or consumers.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Argiris Tsakiris “Oenology”, Publishing house G. Psychalos 2007 (In Greek).
2. Argiris Tsakiris “Greek Wine Appreciation”, Publishing house G. Psychalos 2004 (In Greek).
3. Argiris Tsakiris “Laboratory Teaching Notes”, TEI Athens.

Foreign:

1. Hugh Johnson «Wine Companion», Mitchell Beazley 2003-BBN 1 84000 704 4
2. Emile Peynaud «Le gout du vin» Dunod 1980-ISBN 2 04 010865 3

COURSE SYLLABUS

COURSE TITLE	**: Business Administration**
COURSE CODE	**: TO-61**
COURSE TYPE	**: Theoretical**
COURSE CATEGORY	**: MELH**
WEEKLY TEACHING HOURS	**: 3 (Theory 3)**
CREDITS	**: 4.0**
STANDARD ACADEMIC SEMESTER	**: 6**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand the main concepts, the necessary theoretical principles and the practical applications of business management, with emphasis on subjects of the wine sector, wine and beverage businesses, as well as interrelated activities of tourism, culture, environment-quality of life, gastronomy and well-being, and also to integrate the organizational and administrative perspective into their technological approach and to acquire skills in the application of specific methods and techniques for making business decisions.

COURSE SYLLABUS

Theoretical Part of the Course

Introduction to the concept of business. Types of businesses. Wine and beverage businesses, the interrelated activities of tourism, culture, environment-quality of life, gastronomy and well-being. The business and the environment. Business operations. Theories of administrative organization. Organizational patterns of administration. The organization of businesses engaged in the manufacture and commercial trade of wines and beverages. The organization of production. The organization of administration. The organization of financial services. The organization of logistics. The organization of marketing and sales. The operations of administration: programming, organization, management, coordination, control. Business planning and decision-making. Techniques of effective personnel management. Administration based on objective targets. The organizational chart (distribution of duties, authorization, control, orders - instructions, file keeping, meetings, employee performance incentives). Modern administration of human resources. Staff selection. Staff training. Staff evaluation. Top executives. Job changes. Remuneration policy. Working conditions (health & safety). Communication in administration. Moral, social and environmental responsibility of businesses. Total quality administration. Management of change. Financial Management. New information and telecommunication technologies and business administration. Case study.

EXPECTED LEARNING OUTCOMES

After the completion of the course, the student will be able to:

- Introduce organizational and administrative dimensions and evaluate corresponding issues in the wine sector and businesses directly or indirectly active in this sector.
- Actively participate in the preparation of business plans for the organization and administration of the wine sector and similar business, technical and economic studies, as well as interrelated activities.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Kaldis, P., Nanos, I., Spathis P., Tachopoulos P. and Tsiboukas K., Modern Agricultural Businesses. Book for the 2nd Cycle of the Technical and Vocational Schools, Sector of Agronomy, Food and Environment, All Specializations, Pedagogic Institute Edition – School Book Publishing Organization, Athens, 2005 (In Greek).

1. Arsenos, P. And Kaldis, P., Applied Business Finance, Patakis Editions,

   Athens 2008 (In Greek).

2. Kefis, B., Integrated Management, 1st Edition, Kritiki Editions, Athens, 2005.

3. Tsiotras, G., Quality Improvement, 2nd Edition, E. Benou Editions, Athens, 2002.

4. Prastakos, C., Administrative Science, Editions A. Stamoulis, Athens, 2002.

Foreign:

1. Bateman, T., Zeithami, C. and Snell, S., Management, McGraw-Hill Education, 2001.

2. Jones, G., Organizational Theory, Design and Change, Pearson Education, 2008.

3. Hunger, J. and Wheelen, T., Strategic Management and Business Policy, Pearson Education, 2007.

4. Friend, G. and Zehle, S., Guide to Business Planning, The Economist in association with Profile Books Ltd, U.K., 2004.

5. Stoner, J., Freeman, R.E. and Gilbert, D., Management, Sixth Edition, Prentice Hall Inc., USA, 1995.

6. Newman, M. and Wills, W., Agribusiness Management and Entrepreneurship, Third Edition, Interstate Publishers, Inc., Danville, Illinois, USA, 1994.

COURSE SYLLABUS

COURSE TITLE:	**Quantitative Chemical Analysis**
COURSE CODE:	**TO-22**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**CGS**
WEEKLY TEACHING HOURS:	**5 (Theory 2, Laboratory 3)**
CREDITS:	**5.5**
STANDARD ACADEMIC SEMESTER:	**B**

AIM AND OBJECTIVE OF THE COURSE

The aim of the course is to familiarize students with the basic principles of Chemical Analysis and for them to understand the methods of Classic Chemical Analysis so that they will be able to organize a similar analytical laboratory and successfully make the necessary determinations.

COURSE DESCRIPTION

Theoretical Part of the Course

1. Introduction: Purpose and importance of analytical chemistry. Management of the analytical problem. Methods of Chemical Analysis. Obstructions and their removal. Stages of analytical method. Bibliography.
2. Reagents, equipment and materials: Water and chemical reagents. Equipment and their construction materials. Equipment titration. Equipment cleaning.
3. Sampling: Sampling methods. Factors affecting sampling methods. Types of samples. Management of samples and precautions.
4. Sample processing - I: The need for sample processing. Grinding, Sieving, Heating, Precipitation, Filtration, Centrifugation.
5. Sample processing - II: Extraction. Wet digestion. Fusion. Dry ashing. Effect of microwaves. Wastage of ingredients under analysis.
6. Measurement errors and expression of results: Error types. Management of systematic errors. Measurement uncertainty. Normal error distribution curves. Confidence interval. Rejection of experimental values. Distribution and accumulation of calculation errors. Scientific writing up of results.
7. Statistical techniques in Chemical Analysis: Management of random errors. Comparison of average values, calculation of detection limits, evaluation of systematic differences, comparison of repeatability, calculation of the necessary number of samples, drawing a least squares line. Evaluation of analytical methods.
8. Gravimetric analysis - I: Characteristics of the technique. Types of sediments. Formation of sediments Mechanisms of change in the properties of a sediment. Sediment contamination and its management. Instruments, equipment and materials.
9. Gravimetric Analysis - II: Homogenous precipitation. Precipitation reagents. Applications of gravimetric analysis with precipitation. Evaporation methods. Electrogravimetric analysis. Thermogravimetric analysis.
10. Titration analysis – I: Basic concepts of titration techniques: Categories and types of titrations. Reactivity and chemical balance. Instruments, equipment and materials.

11. Titration analysis - II: a) Acidimetry and alkalimetry. Solvent effect on acid-bases titrations. Standard solutions and markers. Applications. b) Precipitation titrations. Mohr, Volhard and Fajans methods. Standard solutions and markers. Applications.

12. Titration analysis - III: a) Complexometric titrations. Standard solutions and markers. Applications. b) Oxidoreductive titrations. Standard solutions and markers. Applications.

13. Spectroscopic techniques of analysis. UV-Vis Spectroscopy. IR Spectroscopy. Atomic spectroscopy. Mass spectroscopy.

14. Chromatographic techniques of analysis: Gas chromatography. Liquid Chromatography. Basic values in chromatographic analysis. Feedback mechanisms of analyzed compounds with immobile phases.

15. Quality control, laboratory health and safety: Quality systems, benefits and cost. Inspection and review of the quality system. Responsibilities of the Quality Inspector. Responsibilities of management and staff. Laboratory safety. Laboratory waste treatment. Hazards of compounds and equipment.

Laboratory Part of the Course

1. Introduction to titration of acids and bases: Standard solutions and markers, titration curves. Preparation and titration of a standard acid solution.

2. Analysis of an unknown sample of Na_2CO_3 – Preparation and titration of a standard solution of NaOH – acidity analysis in wine or vinaigrette.

3. Analysis of alkaline mixtures with two different and consecutive titrations.

4. Introduction to precipitation titrations – Determination of chloride anions with the Mohr method.

5. Introduction to precipitation titrations – Determination of chloride anions with the Volhard method.

6. Introduction to Complexometric titration – Determination of water hardness.

7. Complexometric determination of Zn and Al.

8. Introduction to oxidoreductive titrations. Preparation and titration of a standard solution of $KMnO_4$.

9. Determination of Fe2+ and H_2O_2 with manganometry.

10. Determination of OC^{1-} and Cu^{2+} with iodometry.

11. Introduction to gravimetric analysis - Determination of Fe/Al in a sample.

12. Gravimetric determination of SO_4^{2-}.

13. Potentiometric titrations of acids-bases.

14. Potentiometric titrations of oxidation-reduction.

15. Potentiometric titrations of precipitation.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will be able to:

- Apply methods of Classic Chemical Analysis,

- Conduct the necessary determinations with safety,
- Solve methodical problems in Classic Chemical Analysis,
- Organize an analytical laboratory.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. S.Papaconstantinou «Quantitative Chemical Analysis – Theory Notes», T.E.I. of Athens 2008 (in Greek)
2. I.A. Stratis, G.A. Zachariadis, A.N. Voulgaropoulos «Introduction to Quantitative Chemical Analysis», Ziti Publications 2000 (in Greek)
3. I.A. Stratis, G.A. Zachariadis, A.N. Voulgaropoulos «Laboratory Methods in Quantitative Chemical Analysis» Ziti Publications 2000 (in Greek)
4. A. Liodakis «Analytical Chemistry», Papasotiriou Publications 2001 (in Greek)

Foreign:

1. D.C. Harris "Quantitative Chemical Analysis, 5th ed.", Freeman 1999
2. D. Harvey "Modern Analytical Chemistry", McGraw-Hill 2000
3. G.J. Shugar, J.T. Ballinger "Chemical Technicians' Ready Reference Handbook, 4th ed.", McGraw-Hill 1996
4. D.A. Skoog & al "Fundamentals of Analytical Chemistry, 8th ed", Brooks-Cole 2004

COURSE SYLLABUS

COURSE TITLE:	**Raw Materials of Alcoholic Beverages**
COURSE CODE:	**TO-33**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**4 (Theory 2, Laboratory 2)**
CREDITS:	**4,0**
STANDARD ACADEMIC SEMESTER:	**3**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is to enable students to understand the need for consistency, methods of production and control of the raw materials used in the production process of alcoholic beverages with emphasis on those produced with pure ethyl alcohol.

COURSE SYLLABUS

Theoretical Part of the Course

1. **BEVERAGE ALCOHOL.** Terminology, use, chemical consistency, calculations for mixture of alcoholic solutions. Methods of determination of sugars in the raw material of alcoholic beverages.
2. **PRODUCTION OF PURE ETHYL ALCOHOL FOR BEVERAGE MAKING.** Enrichment of hydro-alcoholic solutions, perforated discs, fractional distillation of binary mixtures in continuous operation columns.
3. **TRANSFER OF MATERIAL DURING DISTILLATION.** Calculations, flow of material on each disc, calculation of number of discs in the distillation column. Equations and planning of operation lines.
4. **CONTINUOUS DISTILLATION WITH A THREE COLUMN SYSTEM.** Description of columns, operation, products.
5. **VACUUM DISTILLATION WITH A SIX COLUMN SYSTEM** description of columns, operation, products
6. **OTHER TYPES OF ALCOHOL.** Production of pure alcohol, synthetic alcohol, alcohol from cellulose
7. **FRUIT JUICES.** Fruit juice extraction, grape must rectification, fruit juice concentration. Production machinery.
8. **YEAST PRODUCTION.** Yeast production technology. Mechanical equipment for the production of yeast.
9. **INDUSTRIAL FERMENTATIONS WITH THE PURPOSE OF PRODUCING ALCOHOL.** Spontaneous fermentations. Fermentations with the addition of yeast. Continuous fermentations. Industrial equipment.
10. **RAISINS, PRODUCTION OF ALCOHOL FROM RAISINS.** Drying with the purpose of producing raisins. Sugar extraction from raisin. Sugar extraction tanks.
11. **SUGAR CANE, SUGAR BEETS.** Chemical consistency of sugar cane, sugar beets. Sugar-extraction machinery.

12. **MOLASSES SUGAR.** Pure sugar production technology. Production and consistency of molasses. Technology of molasses fermentation.

13. **MATERIALS CONTAINING STARCH.** Consistency and structure of starch. Barley, corn, potato. Hydrolysis technology and fermentation of raw materials containing starch.

14. **PRODUCTION OF ESSENTIAL OILS.** Production of essential oils from various parts of fruits. Machinery for extraction of essential oils. Oily substances used in beverage making.

15. **AROMATIC RAW MATERIALS, INGREDIENTS.** Chemical consistency of essential oils. Anethole and ouzo production.

Laboratory Part of the Course

1. **AROMATIC INGREDIENTS OF OUZO.** Star anise, coriander. Delivery of aromatic ingredients. Physical and chemical properties of anethole.

2. **ETHYL ALCOHOL.** Hydrous, anhydrous calculations.

3. **ESSENTIAL OILS.** Measurement of content of aromatic substances in essential oils through distillation, gas chromatography.

4. **VERMOUTH.** Aromatic substances used in the production of vermouth. Extraction, mixing procedure.

5. **SUGAR BEETS, SUGAR CANE.** Hydrolysis and fermentation of molasses. Production of caramel color.

6. **MALTING.** Production of malt from barley.

7. **STARCHY RAW MATERIALS.** Barley, corn, rice. Solution treatment, acid and enzyme saccharification, pulping, fermentation.

8. **OTHER AROMATIC SUBSTANCES USED IN PRODUCTION OF ALCOHOLIC BEVERAGES.** Juniper (gin) and cumin (aquavit).

9. **RAISINS, GRAPES.** Extraction of sugars from Corinthian raisins and sultanas. Vinification with the purpose of producing distillates, grape distillation.

10. **FRUIT.** Fruit juice extraction. Fermentation with the presence of solids.

11. **LIQUEUR.** Liqueurs from extraction (e.g. mint) and liqueurs from distillation (e.g. orange)

12. **CREAM.** Liqueur production with cream as its base.

13. **MEASUREMENT OF SUGARS IN SUGARY MATERIALS.** Measurement in raisin, molasses.

14. **ALCOHOL CONTENT.** Instrument methods of determining pure alcohol.

15. **QUALITY CONTROL OF PURE ALCOHOL.** Chemical analyses in quality control of pure alcohol.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

1. Know the properties and methods for processing raw materials containing sugars used in the production of pure ethyl alcohol.
2. Be able to work in manufacturing units producing pure ethyl alcohol of agricultural origin, both in the department of fermentation and in the department of distillation.
3. Know the properties and the methods of processing the materials used for flavoring and sweetening alcoholic beverages.
4. Know the methods of quantitative determination and qualitative control of raw materials containing sugars and starch, of pure ethyl alcohol.
5. Know the methods of quantitative determination and qualitative control of aromatic, sweetening and coloring substances used in the production of alcoholic beverages. .
6. Be able to ensure desirable specifications and sensory characteristics of raw materials and semi-finished products in the production process, as well as the final product.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. A. Tsakiri “Alcoholic beverages” Editions Psychalou 2007 (In Greek).
2. Mc Cabe, Smith «Basic physical processes of chemical engineering» Tech. Epim. – 1971 (In Greek).
3. A. Tsakiri “Laboratory Notes Raw Materials of alcoholic beverages” TEI.

Foreign:

1. . K. Jacques "Le Alcohol Textbook" 1999
2. N.J. Elizabeth N.J "Perfume and Flavor Materials of Natural Origin" 1960

COURSE SYLLABUS

COURSE TITLE:	**Seminar and Essay Presentation Techniques**
COURSE CODE:	**TO-EY6**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**2 (Theory)**
CREDITS:	**3,5**
STANDARD ACADEMIC SEMESTER:	**6 or 7**

AIM AND OBJECTIVES OF THE COURSE

1. The aim of the course is for students to become familiar with the basic techniques for the presentation of essays, and to be able to collect, analyze and compose scientific information related to oenological and other processes for the purpose of writing dissertations and other papers.
2. Also, to acquire the skills for writing their curriculum vitae, learn the basic job search techniques and to be able respond to the requirements of a job interview.
3. To know the law and the professional prerogatives and obligations which govern their profession.

COURSE SYLLABUS

Theoretical Part of the Course

1. The profession of Oenologist. History and examples of other countries. Oenology & Entrepreneurship.
2. Law and case law of the profession, professional prerogatives and obligations. Collective Agreements for Oenologists.
3. Employment opportunities and the job market, employment requirements & conditions. Bodies and organizations of the wine sector in Greece and internationally.
4. Review of Oenological processes.
5. Sources of scientific literature (books, scientific magazines, databases, conferences, symposiums, seminars, exhibitions, internet).
6. Methodology for writing essays (literature research, analysis, cross-reference, evaluation and composition of scientific information)
7. Essay Presentation Techniques
8. Learning to use PowerPoint and other similar tools
9. Job search techniques
10. Techniques for writing a CV and cover letter
11. Interview techniques
12. Presentation of essays Part A

13. Presentation of essays Part B
14. Presentation of essays Part C
15. Evaluation of presentations/essays

EXPECTED LEARNING OUTCOMES

After the completion of the course, the students will:

- Be familiar with the law and case law of the profession and their professional prerogatives and obligations
- Be able to organize literature searches and be able to evaluate scientific literature sources
- Understand and be able to present the oenological processes
- Apply the methodology of essay writing (literature research, analysis, cross-reference, evaluation and composition of scientific information)
- Be familiar with modern techniques for presenting essays
- Be aware of the full range of employment opportunities department graduates, the requirements and employment conditions
- Be able to write CVs and cover letters
- Be able to respond successfully to the demands of job interviews

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Kedraka, K. Occupational Consulting for Young People & Entrepreneurship "opens" professional perspectives for young people, 2006. Studies & Career Office, Dimokriteio University of Thrace (In Greek).
2. Karalis, Th., 1999. Job Finding Techniques. Athens, METAICHMIO Editions (In Greek).
3. Troubis, A., K. Polychroni, P. Michalakopoulou, M. Psoma. Writing a CV - Cover Letter & Letter of Recommendation – Interview, 2006. Career Office, University of the Aegean (In Greek).

Foreign:

1. Shaping the college curriculum : academic plans in action, Joan S. Stark and Lisa R. Lattuca, Boston : Allyn and Bacon, 1997
2. Wow! Resumes for sales & marketing careers: how to put together a winning resume, Chuck Cochran and Donna Peerce. New York : McGraw-Hill, c1998
3. 101 best resumes, Jay A. Block, Michael Betrus New York : McGraw-Hill, 1997
4. Electronic resumes : a complete guide to putting your resume on-line, James C. Gonyea, Wayne M. Gonyea,New York : McGraw-Hill, c1996
5. Job hunting after university or college : CVs and application forms, being interviewed, second interviews, Perrett, Jan. De Montfort University, London : Kogan Page, 1996
6. Readymade CVs : a source book for job hunters. Williams, Lynn, 1955, London : Kogan Page, 1996
7. Beyond the CV : securing a lifetime of work in the global market. Vandevelde, Helen. Oxford : Butterworth-Heinemann, 1997

COURSE SYLLABUS

COURSE TITLE:	**Packaging of Wine and Beverages**
COURSE CODE:	**TO-EY1**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**2 (Theory 2)**
CREDITS:	**3,5**
STANDARD ACADEMIC SEMESTER:	**6**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is to present and elaborate on the scientific principles and technical aspects of wine and beverage packaging. The objectives of the course are:

- for students to learn the basic functions of packaging and connect it with the processing, maintenance, distribution and marketing of wine and beverages.
- to be informed on the available materials, forms and packaging systems and understand the ways in which the properties of packaging materials affect the safety, quality and life of wine and beverages.
- to be informed on the law regarding materials and items intended for contact with foodstuffs and beverages, as well as the consequences of packaging on the environment and its recycling potential.
- to be able to choose appropriate materials and packaging forms for the beverage that interests them and to be in a position to resolve problems of quality and life of the beverages relating to the package.
- for students to become familiar with the quality control of packaging means and materials in order to implement it in practice.

COURSE SYLLABUS

Theoretical Part of the Course

History of wine and beverage packaging. Definitions and functions of wine and beverage packaging. Physical and chemical properties and microbiological elements of wine and beverages related to packaging. Glass materials and packaging methods. Metal materials and packaging methods. Thermoplastic polymers for packaging. Processing and shaping of thermoplastic polymers. Paper materials and packaging methods. Combinations of flexible packaging materials. Caps, cork, metal caps, plastic caps, cap rings, special caps. Filling, closing and sealing of beverage packaging. Printing and decoration of packaging. Aseptic processing and packaging. Interactions with packaging – foodstuffs, beverages. Legislation pertaining to the packaging of foodstuffs and beverages. Packaging of foodstuffs and beverages and the environment.

EXPECTED LEARNING OUTCOMES

After completion of the course, the students will:

- be familiar with the basic functions of packaging and connect it with the processing, maintenance, distribution and marketing of wine and beverages.
- be familiar with available materials, forms and packaging systems and understand the ways in which the properties of packaging materials affect the safety, quality and life of wine and beverages.
- be familiar with the law regarding materials and items intended for contact with foodstuffs and beverages, as well as the consequences of packaging on the environment and its recycling potential.
- be able to choose appropriate forms of material and packaging for the beverage that interests them and be in a position to resolve problems of quality and life of the beverages related to the packaging.

BIBLIOGRAPHICAL REFERENCES:

Greek

1. Papadakis, S.E., (2000). "Foodstuff Packaging Notes", TEI Athens, Athens (in Greek)
2. Soufleros, E.H., (2000). *Oenology, Science and Know-how.* Volume II, Part 5, pg. 317-390, Thessaloniki (In Greek)
3. Tsakiris, A.N. (1996). *Oenology, From grape to wine.* Pg. 231-265, Editions Psychalou, Athens. (In Greek)

Foreign

1. Bathe, P. (1997). "Developments in the packaging of alcoholic drinks", Pira International, Leatherhead, Surrey, UK.
2. Brody, A.L. and Marsh, K.S., (eds.), (1997). "The Wiley Encyclopaedia of Packaging Technology", 2nd edition, John Wiley & Sons Inc., New York.
3. Giles, G.A. (1999). "Handbook of Beverage Packaging", Sheffield Food Technology series, CRC Press.
4. Lee, D.S., Yam, K.L. and Piergiovanni, L. (2008). "Food Packaging Science and Technology", CRC Press, Taylor & Francis Group, Boca Raton, FL.
5. Priest, F.G. and Stewart, G.G. (2006). "Handbook of Brewing", 2nd ed., CRC Press, Taylor & Francis Group, Boca Raton, FL.
6. Robertson, G.L. (2006). "Food Packaging: Principles and Practice", Second Edition, CRC Press, Taylor & Francis Group, Boca Raton, FL.
7. Soroka, W. (1996). "Fundamentals of Packaging Technology", revised UK edition, The Institute of Packaging, Melton Mowbray, Leicestershire, UK.

COURSE SYLLABUS

COURSE TITLE:	**Wine and Must Composition & Analysis**
COURSE CODE:	**TO-35**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**6 (Theory 2, Laboratory 4)**
CREDITS:	**5,5**
STANDARD ACADEMIC SEMESTER:	**3**

AIM AND OBJECTIVES OF THE COURSE

The theoretical part of this course will familiarize students in depth with the particularly complex chemical composition of must and wine.

They will understand the origin and the importance of each chemical compound or groups of compounds separately, as well as the importance of the interaction of the various compounds or groups of compounds with each other.

Through the deeper knowledge of this course, students will be able to direct vinification in a manner that advances – or avoids – the composition or expression of desirable or undesirable chemical compounds respectively.

They will also acquire the necessary skills to discern, through the chemical composition of a wine, information regarding the history, technology and organoleptic response to the specific wine.

COURSE SYLLABUS

Theoretical Part of the Course

1. Acidic composition of must & wine. The various forms of acidity. The meaning of pH and its applications. Volatile acidity of wines.
2. Organic acids of must & wine. Basic organic acids. The crystallization & settlement mechanism of tartaric acid salts.
3. Alcohols and other volatile compounds. Ethyl alcohol. Other simple alcohols. Polyols. Fatty acids. Esters. Aldehydes, ketones & lactones.
4. Sugars. Glucose and fructose. Other sugars. The chemical properties of sugars. Sugar derivatives. Extracellular polysaccharides of microorganisms.
5. Colloid large molecules in must. Pectins and polysaccharides. Pectolytic enzymes.
6. Nitrogenous compounds. The various forms of nitrogen in must and wine. Aminoacids. Proteins and the mechanism of protein haze. Biological amines.
7. Phenolic components. The nature, character and properties arising from the structure of polyphenolic compounds.

8. Anthocyanins and tannins of red wines. The biosynthesis of anthocyanins during the ripening of grapes. The extractability of anthocyanins and tannins during vinification.
9. Chemical and sensory properties of anthocyanins and tannins. The chemical reactions of polyphenolic compounds in the maturation and aging of wines. The colour of wines. The settlement of pigments and the stability of the color of red wines.
10. Sulphur dioxide in must and wine. Forms of sulphur. Relationship of the forms of sulphur with wine Ph values.
11. Mineral components of must and wine. Solid residue. Ash. Anions. Cations.
12. Iron and the mechanism of iron haze. Copper and the mechanism of copper haze. Heavy metals.
13. Compounds responsible for primary – varietals – aromas. Terpenes. C 13 derivatives. Methoxy-pirazines. Sulphur compounds. The development of primary aromas during the maturation and aging of wines.

Laboratory Part of the Course

1. Determination of density in must and wine. Methods: Standard (densimeters) and Reference (lupine), sugar calculation from measurement of density. .
2. Analytical determination of reducing sugars: a) Lane-Eynon method, b) Luff-School method.
3. Determination of Solid Residue in must and wine.
4. Alcohols A: Determination of ethyl alcohol with: a) areometers, b) lupine, c) oxidation (chemical determination).
5. Alcohols B: Methanol, higher alcohols (n-propanole, isobutanole, amyl alcohol, isoamyl alcohol), glycerol, 2, 3 butanediol.
6. Must and wine acids A: Titratable and active acidity (pH). Definition and importance of volatile acidity in wine products.
7. Must and wine acids B: Determination of acids: tartaric, malic and lactic.
8. Determination of sulphur dioxide in wine products: A: Standard method, B: Reference method (sulphur device).
9. Phenolic components of wines. Anthocyanins (Color characteristics). Tannins, other phenolic components.
10. Mineral components of must and wine: Determination of ash in wines. Alkalinity of ash.
11. Nitrogen components of must and wine. Proteins, Aminoacids, Vitamins, Biological amines, etc.
12. Carbonyl compounds of must and wine: Aketaldehyde, acetoine, diacetyl. Determinations: Enzymatic, spectrophotometric, gas chromatographer.
13. Wine esters. Importance of esters in wines and their determination with gas chromatography.
14. Primary aromatic components of wines: Terpenes. Determination with gas chromatographer. .
15. Aging aromas. Wood compounds, eugenol, vanillin. Determination with gas chromatographer.

EXPECTED LEARNING OUTCOMES

After completion of the course, the students will:

- Have acquired in-depth knowledge of the complex chemical composition of must and wine.
- Understand the origin and the importance of each chemical compound or groups of compounds separately, as well as the importance of the interaction of the various compounds or groups of compounds with each other.
- Be able to direct vinification in a way that advances – or avoids – the composition or expression of desirable or undesirable chemical compounds respectively.
- Discern, through the chemical composition of a wine, information regarding the history, technology and sensory response of the specific wine.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Stavroula Kourakou-Dragona. “Oenology Subjects”. Trohalia, Athens 1998 (In Greek).
2. Evaggelos Soufleros. “Oenology. Science and Know-how”. Copyright © 1997 (In Greek).
3. Evaggelos Soufleros. “Wines and Distillates”. Copyright © 1997 (In Greek).
4. Argiris Tsakiris. “Oenology. From grape to wine”. Editions Psychalos. Athens 1998 (In Greek).

Foreign:

1. Pascal Ribereau-Gayon, Yves Glories, Alain Maujean, Denis Dubourdieu. "Traite d' CEnologie (Vol.2)". Dunod, Paris 1998
2. Ron S. Jackson. "Wine science. Principles and applications".Academic Press, Inc. California, 1994
3. Emile Peynaud. "Connaissance et travail du vin". Dunod, Paris 1981.

COURSE SYLLABUS

COURSE TITLE	**Design of Industries of Wine & Alcoholic Beverages**
COURSE CODE	**TO-EY8**
COURSE TYPE	**Theoretical**
COURSE CATEGORY	**Specialization Course (SC)**
WEEKLY TEACHING HOURS	**2 (Theory 2)**
CREDITS	**3,5**
STANDARD ACADEMIC SEMESTER	**7**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to acquire the necessary knowledge to allow them to play a decisive role in the design of a new production unit or the modification of an existing one, according to economic capacity, based on market needs, health and safety in the workplace and protection of the environment.

COURSE SYLLABUS

Theoretical Part of the Course

1. Characteristics, applications, tools and stages of design.
2. Investment plans and evaluation of alternative proposals.
3. Preliminary study and feasibility study.
4. Support studies – I: Market evaluation.
5. Support studies – II: Environmental impact studies.
6. Flow charts: Types, usefulness, symbols.
7. The industry and the market for wine and alcoholic beverages in Greece: problems, trends, proposals and perspectives.
8. Health and safety in wine and alcoholic beverage industries – I: HACCP systems and risk analysis.
9. Health and safety in wine and alcoholic beverage industries – II: Health and Good Industrial Practice. Implementation of Good Industrial Practice in construction, cleaning and disinfection of production areas and equipment. Pest control.
10. Health and safety in wine and alcoholic beverage industries – III: Human errors, risks and their handling.
11. Wine industry equipment.
12. Beer industry equipment.

13. Alcoholic beverage industry equipment.
14. Water and its industrial uses – I: Drinking water.
15. Water and its industrial uses – II: Cooling water.

EXPECTED LEARNING OUTCOMES

After the completion of the course, the students will be able to:

- evaluate an investment proposal for the establishment or modification of an existing wine or alcoholic beverage industrial unit;
- assess the required main and auxiliary equipment;
- ensure the operation of a production unit with safety for workers and respect for the environment.

BIBLIOGRAPHICAL REFERENCES:

Greek:

22. S. Papakonstantinou "***Design of industries – Theory notes"*** TEI Athens 2003 (in Greek)
23. D. Marinos – Kouris, Z.B. Maroulis ***"Design of Chemical Industries",*** Ed. Papasotiriou, 1993 (In Greek).
24. A.I. LYgeros, D. Marinos – Kouris, ***"Symbols of Flow Charts of Chemical Industries",*** University Editions NTUA 1998 (In Greek).
25. S. Karvounis "***Feasibility Studies: Methodology"*** Ed. A. Stamoulis, 2000
26. I.S. Arbanitogiannis, D. Sandrou, L. Kourtis ***"Food Safety"*** USP 2001 (In Greek).
27. A. Tsakiris ***"Oenology"*** Ed. Psychalou 1998 (In Greek).
28. G. Vavizos, K. Zannaki ***"Ecological Theory and Practice in Environmental Studies"***, Ed. Papazissi 1998 (In Greek).
29. F. Rigas ***"Industrial Safety"*** Ed. Papasotiriou, 2005.

Foreign:

9. R.P. Vine & al ***"Winemaking",*** Chapman & Hall 1997
10. D.R. Storm ***"Winery Utilities",*** Chapman & Hall 1997
11. T. Goldammer ***"The Brewers' Handbook",*** KVP Publishers 1999
12. T. Kletz ***"An Engineer's View of Human Error, 3rd ed.",*** CRC Press 2001
13. ITV France ***"Hygiene en oenologie",*** Dunod 2004

COURSE SYLLABUS

COURSE TITLE	: Sales Techniques for Wines and Beverages
COURSE CODE	: TO-EY5
COURSE TYPE	: Theoretical
COURSE CATEGORY	: MELH
WEEKLY TEACHING HOURS	: 2 (Theory 2)
CREDITS	: 3,5
STANDARD ACADEMIC SEMESTER	: 7

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand the main concepts of sales promotion, as well as their management with reference to products of the wine sector, wine and beverage businesses, as well as interrelated activities of tourism, culture, environment-quality of life, gastronomy and well-being; to familiarize students with good practices and applications, elements necessary to a competitive perspective in the wine sector and the commercial efficiency of wine and beverage businesses; and to acquire skills for the application of selected sales promotion techniques.

COURSE SYLLABUS

Theoretical Part of the Course

Introductory concepts and special subjects of applied marketing. Buying behavior of consumers and organizations. Promotion of sales: tools-incentives, steps-decisions (goal-setting, tool selection, scheduling, preliminary schedule control, implementation and control of schedule, evaluation of schedule). Sales force management: design (goals, strategy, structure, size, reward), management of sales staff (recruitment, selection, training, direction, motivation, evaluation). Personal sale principles: the sale (identification and evaluation of customers, preliminary approach, approach, presentation and demonstration, handling objections, closing the sale, after-sale actions), negotiation (negotiation strategy, techniques), relationship management. International sales. Legal and ethical issues. Sales and new information and telecommunication technologies. Case study.

EXPECTED LEARNING OUTCOMES

After the completion of the course, the student will be able to:

- Successfully negotiate the promotion of products of the wine sector and of businesses directly or indirectly active in this sector.
- Actively participate in the preparation of promotional plans for the sale of products of the wine sector, as well as preparation of technical and financial feasibility studies for businesses active in the sector and other interrelated fields.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Veltras, N., Sales Marketing. Two rings in the same chain, Third Edition, Editions A. Stamoulis, Athens, 2003 (In Greek).
2. Avlonitis, G. and Stathakopoulos, B., Effective Organization and Management of Sales, 2nd Edition, Editions Stamouli, Athens 2008 (In Greek).
3. Panigirakis, G. and Zairis, A., The Art of Sales Editions Kritiki, Athens, 2006 (In Greek).
4. Jobber, D. and Lancaster, G., Selling and Sales Management, Editions Kleidarithmos, Athens, 2005 (In Greek).
5. Prastakos, C., Administrative Science, Editions A. Stamoulis, Athens, 2002 (In Greek).

Foreign:

1. Wagner, P., Olsen, J. and Thach, L., Wine Marketing and Sales, The Wine Appreciation Guild, USA, 2007.
2. Wayne, T,, The Sales Manager's Success Manual, Amacom, 2007
3. Lapsley, J. and Moulton, K., Successful Wine Marketing, Springer Science and Business Media, Inc. 2001.
4. Hall, M. and Mitchell, R., Wine Marketing: A Practical Guide, Elsevier Ltd, 2008.
5. Kotler, P., and Armstrong, G., Principles of Marketing, Pearson Education, 2007.
6. Burkitt, H. and Zeallen, J., Marketing Excellence, John Willey and Sons Ltd, 2006.
7. Pride, W. and Ferrell, O., Marketing, Houghton Mifflin Co, 2007.

COURSE SYLLABUS

COURSE TITLE:	**Technology and Analysis of Distillates**
COURSE CODE:	**TO-55**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**5 (Theory 3, Laboratory 2)**
CREDITS:	**6,0**
STANDARD ACADEMIC SEMESTER:	**5**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand the technology for the production of the various distillates and use the methods of analysis employed both in the production process and in quality control of distillates.

COURSE SYLLABUS

Theoretical Part of the Course

1. PRODUCTION HISTORY (Conjectures about the origins of distillate production. The progress of production. Types of distillates).
2. OUZO (Chemical composition, anethole, pure alcohol, aromatic substances, distillation, blends, filtration, bottling).
3. OUZO DISTILLATION POT STILLS (Distillation and fraction separation technology).
4. BRANDY (Grape juice fermentation, fractional distillation, blending, bottling).
5. BRANDY DISTILLATION POT STILLS (Distillation technology in discontinuous stills and fraction separation).
6. BRANDY AGING (Production of barrels. Use of barrels. Changes in the chemical composition of distillates. Brandy labeling. Legislation).
7. ARMAGNAC COGNAC (Production of wine for distillation. Continuous and discontinuous operation machinery, aging. Production regions).
8. RUM (Fermentation of sugar cane juice, molasses, distillation appliances, aging).
9. VODKA, GIN, AQUAVIT (Production of vodka, gin, aquavit and other alcoholic flavored beverages).
10. WHISKEY (Processing of materials containing starch, saccharification, roasting, fermentation, distillation, aging, Production regions).
11. PRODUCTION MACHINERY (Continuous and discontinuous operation distillation machinery).
12. FRUIT DISTILLATIONS (Fermentation of fruit juice. Distillation, aging).
13. LIQUEURS (Liqueurs produced via extraction and distillation, as well as with use of cream).
14. MEASUREMENT OF AROMATIC COMPONENTS WITH ANALYTICAL METHODS (Methods of measuring content in alcohol of distillations and final products. Measurement of higher alcohols, aldehydes, esters, volatile acidity).
15. MEASUREMENT WITH GAS CHROMATOGRAPHY (Determination of aromatic components of distillates. Inspection of production processes).

Laboratory Part of the Course

1. Measurement of alcoholic strength and use of tables (Glass distillation device).
2. Blending of hydroalcoholic solutions (Contraction and expansion, dilution, strengthening).
3. Distillation in copper pot still – Distillation of marc in the copper distillation appliance of the Department.
4. Composition alcohol's water vapors – Measurement of composition of vapors and water solution of alcohol in a special distillation appliance.
5. Distillation with distillation appliance with trays– Operation of the 9 tray distillation appliance of the Department. Operating curves.
6. Measurement of energy required for distillation – Measurement of electricity consumption, performance calculation. Measurement of cooling water consumption.
7. Measurements of groups of components with analytical methods – Preliminary preparation of solution. Measurement of volatile acidity.
8. Measurement of content in aldehydes – Measurement of aldehydes with analytical method.
9. Measurement of content in esters – Measurement of esters with analytical method.
10. Operation of Gas Chromatographer – Conditions of operation.
11. Operation of Gas Chromatographer – Preparation and chromatography of standard solution.
12. Operation of Gas Chromatographer – Chromatography of wine distillation fractions.
13. Operation of Gas Chromatographer – Chromatography of wine distillation fractions.
14. Operation of Gas Chromatographer – Peak identification and calculations.
15. Operation of Gas Chromatographer – Measurement of anethole content.

EXPECTED LEARNING OUTCOMES

After completion of the course, students will:

1. Understand the methodology for the production of alcoholic beverages, the operation and use of essential mechanical equipment.
2. Be familiar with the operation of distillate production machinery.
3. Be able to prepare alcoholic beverages using modern and traditional methods.
4. Be able to monitor and inspect the alcoholic beverage production process.
5. Select the appropriate instruments and implement the appropriate analysis methods.
6. Be able to apply the appropriate chemical and physicochemical methods of analysis on alcoholic beverages.
7. Be able to check analytical data.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Argiris Tsakiris. “Alcoholic Beverages” G. Psychalos, 2007 (In Greek)
2. Evaggelos Soufleros "Wine and Distillates”, Self-published 1997 (In Greek).
3. Argiris Tsakiris “Laboratory Notes of the Technology and Analysis of Distillates”, TEI (In Greek).

Foreign:

1. A.H.Rose "AlcoohlicBeverages" Academic Press 1977
2. Recueil des methodes internationales d'analyse des boissons spiritueuses, des alcools et de la fraction aromatique des boissons Office International de la Vigne et du vin, 1994
3. Alan H. Varnam and Jane P "Beverages : technology, chemistry and microbiology". Sutherland Chapman & Hall, 1994

COURSE SYLLABUS

COURSE TITLE:	**Technology of Malting and Brewing**
COURSE CODE:	**TO-71**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**8 (Theory 3, Laboratory 5)**
CREDITS:	**8,0**
STANDARD ACADEMIC SEMESTER:	**7**

AIM AND OBJECTIVES OF THE COURSE

1. The aim of the course is for students to understand the technology of both malting and brewing, that is, to learn the stages for the production of beer and understand the importance and purpose of each stage.
2. For students to participate in the mechanical and chemical-technical analyses of barley and malt, and also in the quality control of malt and beer.
3. To produce their own malt and then their own beer, and be in a position to evaluate their final product.

COURSE SYLLABUS

Theoretical Part of the Course

Introduction to malting-brewing. Malt production stages. Quality and quantity control of malt. Beer production stages. Qualitative and quantitative evaluation of beer.

- Botanical and morphological characteristics of barley.
- Cultivation and varieties of barley.
- Morphology, structure and chemical composition of barley grains.
- Physiology of barley grain, dormancy.
- Specifications and quality control of barley for malting.
- Malt production stages (Soaking, Germination, Drying).
- Special malts.
- Physicochemical changes of barley during conversion to malt.
- Quality and quantity control of malt.
- By-products of malting and their utilization. Malting waste.
- Raw materials of brewing (Malt, Water, Hops, Brewer's yeast).
- Beer production stages (Malt grinding, pulping, filtering, wort collection, boiling – addition of hops, removal of sediments, Production of green beer, fermentation, maturation, stabilization, delivery of beer, packaging, pasteurizing).
- Quality and quantity control during the various stages of brewing.

- Categories and types of beer.
- New technologies in the production of beer. Production of special types of beer.
- Classic and modern methods of quality control of beer. Physicochemical and microbiological analyses.
- Sensory testing of beer. Faults and flaws in beer and how to avoid them.
- Utilization of brewing by-products, waste management. Technical and financial elements in the establishment and operation of breweries.

Laboratory Part of the Course

Quality control of barley. Laboratory micro-malting. Quality control of malt. Raw materials of brewing. Laboratory micro-brewing. Production of wort. Production of green beer. Production of beer. Quality control of beer. Performances of production procedure

- Macroscopic and microscopic examination of barley grain.
- Mechanical analyses of barley (1000 grain weights, hectoliter weight, classification by size).
- Description of grain structure (mitadine and vitreous aspects).
- Chemical and technical analyses of barley (determination of humidity, extraction and barley husks).
- Determination of germination capacity, germination activity and sensitivity of barley to water.
- Laboratory micro-malting (Soaking, Germination, Drying).
- Determination of water absorption capacity of barley. Determination of solubility grades. Determination of micro-malting performance.
- Sensory testing of malt. Brittleness of malt.
- Mechanical analyses of malt (1000 grain weight, hectoliter weight, classification by size).
- Determination of extraction performance of malt, saccharification time, filtering speed, color and viscosity of wort.
- Determination of alpha-amylase power, total and soluble nitrogen, Kolbach number in malt.
- Determination of Hartong number, beta-glucans, difference of extract between coarsely ground and finely ground malt.
- Brewing water, specifications, quality control and processing.
- Hops, specifications and evaluation of quality, hop products.
- Yeast, special characteristics of brewer's yeast, production of pure cultures and their maintenance, use of dry yeast.
- Production of wort (Malt grinding, pulping, filtering, collection of wort, boiling – addition of hops, removal of hot sediment, cooling, ventilation, removal of cold haze).
- Quality control of wort.
- Production performance of wort.
- Green beer production (wort innoculation, fermentation, yeast separation).
- Production of beer (Maturation, stabilization).
- Beer production performance.
- Determination of extract of initial wort. Determination of beer fermentation degree.
- Determination of sugars in beer. Determination of final beer fermentation grade.
- Determination of carbon dioxide in beer.

- Determination of total nitrogen and alpha-amino nitrogen in beer.
- Determination of diacetyl in beer.
- Determination of bitterness units of beer. Determination of polyphenoles in beer.
- Determination of color, clarity, viscosity, foam in beer.
- Sensory testing of beer.

EXPECTED LEARNING OUTCOMES

After the completion of the course, the students will be able to:

- Understand the biological, enzyme and chemical processes occurring during malting – brewing.
- Carry out the required analyses.
- Produce malt (malting)
- Produce beer (brewing).
- Evaluate the results with critical thinking and be aware of their effect on the production procedure.
- Know the machinery used by malting units and breweries.

BIBLIOGRAPHICAL REFERENCES

Greek

1. H. Grigorakis and V. Theodosiou, Malting – Brewing Technology, TEI Athens 2008 (In Greek).
2. Th. Masouras, Quality Control of Beer, TEI Athens 2004 (In Greek).

Foreign

1. G. H. Palmer, Cereals in malting and brewing. In Cereal Science and Technology, Aberdeen University Press, Scotland, 1989.
2. G. H. Palmer, Cereal science and malting technology-The future. Journal of the American Society of Brewing Chemists 50(4): 121-129, 1992.
3. M. J. Lewis and T. W. Young, Brewing, Chapman & Hall, 1995.
4. M. Koliatsou, Structural Properties of the Endosperm of Malting Barley, PhD Thesis, Heriot-Watt University, Edinburgh, Scotland, 2003.

COURSE SYLLABUS

COURSE TITLE:	**Technologies for Use of By-Products**
COURSE CODE:	**TO-EY4**
COURSE TYPE:	**Theoretical**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**2 (Theory 2)**
CREDITS:	**3,5**
STANDARD ACADEMIC SEMESTER:	**6**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is to help students understand the concept of integrated vinification. The objective of the course is to become familiar with and analyze the technologies for the use of wine by-products which could be applied in vinification processes.

COURSE SYLLABUS

Theoretical Part of the Course

Integrated vinification includes all technologies that accompany vinification for the efficient use of the vine and efficient vinification. By-products from the vineyard to the bottle in the vinification process constitute an important chapter in the economics of vinification. There are under-layers produced during vinification, which could be used to produce other products. For example, starting with the vineyard and the by-products of pruning to the biomass produced during vinification, there are under-layers which could be converted into useful products using the appropriate technology.

Some of the subjects students will focus on are:

- **Lignin-cellulose** by-products of the vineyard, such as branches and leaves.
- The **biomass** of must production and vinification.
- **Marc spirit:** Processing of mark, distillation, aging. Composition and characteristics of marc distillates.
- **Tartaric Acid and Tartaric Salts:** Processing of grape marc and wine lees, processing of argol, processing of dry raisins. Chemical analyses. Specifications for disposal of tartaric acid and its salts.

- **Grape seed oil:** Separation of grape seeds from marc, cleaning, drying, crushing, firing. Extraction of grape seed oil, chemical composition and analyses. Specifications of production and sale.
- **Collection of Tannins and Anthocyanins.**
- **Vinegar:** Types of vinegar, acid fermentation, methods of production, finish, aging, chemical testing, sale specifications.
- **Use of marc as animal feed and fertilizer.**
- **Production of primary and secondary metabolites from biomass.**

EXPECTED LEARNING OUTCOMES

After the completion of the course, the students will be able to:

- Assess integrated vinification and its various stages.
- Be familiar with fermentation technologies.
- Propose solutions for the utilization of by-products.

BIBLIOGRAPHICAL REFERENCES:
Greek:

1. Elias Nerantzis 2007 Integrated Vinification. Notes, TEI Athens (In Greek).

COURSE SYLLABUS

COURSE TITLE:	**Physical Processes**
COURSE CODE:	**TO-34**
COURSE TYPE:	**Combined**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**5 (Theory 3, Laboratory 2)**
CREDITS:	**5,5**
STANDARD ACADEMIC SEMESTER:	**3**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is for students to understand the basic principles and techniques for the study of physical processes, including: basic laws, mass and energy balances, transfer rates, dimensions, unit systems.

COURSE SYLLABUS

Theoretical Part of the Course

1. Introduction (Units and dimensions, mass and energy balances)
2. Static – Dynamic behavior of fluids (Basic principles of fluid flow)
3. Fluid flow on surfaces and in pipes (Flow of multi-phase mixtures).
4. Pumping and mixing
5. Basic principles and the laws of Thermodynamics and psychrometry.
6. Heat transfer
7. Alternators
8. Evaporation - Distillation.
9. Extraction – Adsorption
10. Absorption – Moisture absorption
11. Drying
12. Membrane filtering – Crystallization.
13. Solid particles
14. Sieving - subsidence
15. Filtration – Centrifugation - Flotation.

Laboratory Part of the Course

1. Psychrometric exercises.
   I. Use of psychrometric maps and sling type psychrometers
   II. Calculation of cooling power of a laboratory evaporator
   III. Calculation of humidity absorption rate in an air current drier
2. Alternators: Measurement of the total heat transfer coefficient and thermal losses in pipe alternator/pipe.
3. Adsorption.
4. Sieving
5. Settlement
6. Drying – dehydration of products
7. Evaporation of simple vertical pipe simple energy
8. Study of a single stage centrifugal pump
9. Recovery of aromatic components from juice with distillation.
10. Equations of solid particle movements in liquids.
11. Heat transfer during forced air flow inside pipes
12. Extraction
13. Centrifuging
14. Liquid flow.
    I. Calculation of volumetric liquid supply – flow meter rating.
    II. Measurement of local and linear losses along the length of a flow line.
15. Viscometry.
    I. Finding the rheological constants of the Ostwald - de Waele law with the use of a Brookfield viscometer.
    II. Measurement of relative viscosity with an Ostwald viscometer at various temperatures.
    III. Measurement of dynamic viscosity with free falling beads

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will be able to apply the principles and techniques of physical processes to standard practices, pertaining to:

- Fluid mechanics
- Heat transfer

- Solid particle processing equipment needs of wineries and other alcoholic beverage industrial facilities.

BIBLIOGRAPHICAL REFERENCES:

Greek:

30. A. Labropoulos, St. Anestis "Mechanical and thermal processes of foodstuffs – Theory". Ed. PYLES 2005 (In Greek)
31. A. Labropoulos, St. Anestis "Mechanical and thermal processes of foodstuffs – Laboratory Manual" Ed. PYLES 2005 (In Greek)
32. W.L. McCabe, J.C. Smith and P. Harriott «Unit Operations of Chemical Engineering, 6th ed." Ed. Tziola 2003 (In Greek).
33. Labropoulos A., Mechanical Process Techniques in the Foodstuff and Beverage technology. STRETROD Notes, TEIA 1998 (In Greek).
34. Anestis E.S. Basic principles in Fluid Mechanics, 2004.
35. Saravakos, G., Thermal Process Technique, 1979 (In Greek).

Foreign:

36. Charm S.E., The fundamentals of Food Engineering, AVI Publ. Cp. Westport, Conn.
37. Remman J.G., Butters J.R., Cowell N.D. and Lilly , Food Engineering Operations, Elsevier Science Publ.
38. Lonein M. and Merson R.L., Food Engineering Principles and selected applications. Acad. Press . N.Y.

COURSE SYLLABUS

COURSE TITLE	**Physics**
COURSE CODE	**TO-14**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: Course of General Structure (CGS)**
WEEKLY TEACHING HOURS	**: 4 (Theory 2, Laboratory 2)**
CREDITS	**: 4,0**
STANDARD ACADEMIC SEMESTER	**: 1**

AIM AND OBJECTIVES OF THE COURSE

The aim of the course is:

a) To provide basic knowledge of General Physics, with selection of specific chapters and subjects with particular interest for the subject matter of Oenology.

b) To provide all specialized General Physics knowledge, on which modern methods of technological interest are based and

c) To familiarize the student with technology, rational approaches to thinking and the development of skills, particularly through the opportunities offered by practical exercises in the Physics laboratory, which pertains to the handling of experimental conditions, the assessment of values and quantities through simple calculations and the processing of experimental data arising from these measurements, as well as a series of theoretical calculation exercises.

COURSE SYLLABUS

Theoretical Part of the Course

Introduction, Energy in Nature, Power and simple machines.

Heat and thermodynamic principles (Heat transfer, calorimetry, changes in condition of bodies, laws and thermodynamic axioms, study of biological phenomena, exercises and arithmetical examples of applications).

Fluid mechanics (hydrostatic principles, pressure and measurements, real and ideal fluids, hydrodynamic elements, types of flows and categories of fluids, surface tension, transfer and osmosis phenomena, applied practical exercises and arithmetic examples).

Optics and principles of operation of optical instruments, lasers and their applications.

Electronic microscopy (principles of operation and types of EM systems, stoichiometric analysis using X rays).

Spectroscopy principles (spectral areas and method of optical and magnetic spectroscopy)

Radioactivity and dosimetry (nuclear physics elements, radioactive disintegration and radiation, radioactivity measurement, biological effects and results, applications in food technologies).

Sensors and converters (electrical measurements and recording and indication instruments, telemetry systems, applications).

Laboratory Part of the Course

The laboratory part of the course includes:

General introduction to the Physics laboratory.

- Briefing on the operation of the Physics Laboratory and methods for writing technical reports (project sheets), introduction to measurements, processing of experimental data, calculation and assessment of errors, important digits and diagrams.
- Theoretical exercises (data processing and results of theoretical measurementsA series of experimental / laboratory exercises on the subjects of:
- Measurement of lengths and radius of surface curvature.

- Determination of density of solids and liquids with the hydrostatic balance
- Measurement of acceleration of gravity with the simple pendulum
- Calculation of spring constant via the Hooke law and the oscillation of bodies.
- Measurement of internal friction to fluids factor
- Study of solid body: Steiner's theorem
- Calorimetry: Determination of relationship between Joule and cal.
- Determination of linear expansion factor
- Supply at true fluids: Confirmation of Poisseuille law
- Light bias: Malus law and the rotation capability of material (sugar)
- Measurement of speed of sound in the air
- Determination of speed of rotary pump pumping, creation and measurement of vacuum
- Finding the elasticity threshold and the fracture threshold for materials.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will have acquired general theoretical knowledge and knowledge of the applications arising from it in the specific chapters of general Physics which constitute a fundamental background for a series of other specialization courses. They will be enabled to understand modern methods, technologies and generally established applications that are already in common use or will be introduced in practice. They will have acquired skill and familiarity in the operation of measurement instruments, the procedures of measurement themselves and statistical processing of experimental data, the concept of error and the quality and quantity assessment of values. In the laboratory, students will also learn to make use of and apply common computational algorithms and software for collecting and subsequently analyzing data, and will also become familiar with methods of writing and presenting technical reports.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Th. Karakostas and F. Komninos, Special Physics Chapters, Ziti Editions, Thessaloniki 2002 Code 960-431-185-9 (In Greek).

2. I.E. Fragidakis, Special Physics Issues, Ziti Editions, Thessaloniki 2002 ISBN 960-431771-7 (In Greek).

3. I. Sianoudis *Physics Experiments: Laboratory Exercises for Oenologists*, Lychnos Editions, Athens 2008 ISBN 978-960-6607-48-6 (In Greek)

4. Hugh D. Young *University Physics, volume A*, Editions Papazissi, Athens 1995, ISBN: 960-02-1088-8. (in the collection of Physics books in the central Library in 10 copies)

5. Physics, Mechanics, Editions of Hellenic Open University

6. Alexopoulos Kaisar, D., Marinos Dionysios Il, *General physics*, Editions Papazissi, Athens 1993 ISBN 960-02-0981-2 (In Greek)

Foreign:

9. I.W. Richardson, E.B. Neergaard, Physics for Biology and Medicine, Wiley-Interscience, London 1972

10. H. Cromer, Physics for the life sciences, McGraw-Hill Book Co., 1981

11. David Halliday, Robert Resnick, Jearl Walker, Fundamentals of Physics, 6th Edition, 2001, ISBN: 978-0-471-32000-5

*) Foreign and Greek books number 4, 5 and 6 are found in copies in the collection of Physics books in the central Library of the TEI.

**) Additionally bibliographic references, as well as a series of complementary educational materials, such as exercises, software, notes and individual book excerpts in PDF form, are provided online, on special webpages for the exclusive use of course students (closed access collection).

COURSE SYLLABUS

COURSE TITLE	**: Physical Chemistry**
COURSE CODE	**: TO-23**
COURSE TYPE	**: Theoretical, Laboratory**
COURSE CATEGORY	**: CGS**
WEEKLY TEACHING HOURS	**: 5 hours (Theory 2, Laboratory 3)**
CREDITS	**: 5,5**
STANDARD ACADEMIC SEMESTER	**: B'**

AIM AND OBJECTIVE OF THE COURSE

The aim of the course is to familiarize students with the basic concepts and principles of Physical Chemistry and its simple applications, as well the properties and uses of the commonest physiochemical systems. To develop skills and the appropriate background knowledge for understanding of the phenomena which students are likely to encounter in matters relating to Physical Processes and Instrumental Chemical Analysis.

COURSE DESCRIPTION

Theoretical Part of the Course

- First law of thermodynamics: Work and heat. Enthalpies of formation and their temperature dependence. Ideal gas laws. Work done in adiabatic expansion.
- Second law of thermodynamics: Entropy of non-reversible processes. Gibbs Helmholtz energies. Combination of the 1st and 2nd law. Chemical potential of a pure substance and a substance in a mixture.
- Physical transformations of pure substances. Phase diagrams of pure substances. Phase stability and transition between phases. Degrees of freedom and the phase rule.
- Solutions: Thermodynamic description of mixtures and solutions. Liquid mixtures. Additive properties of solutions. Activity of solvent and solute.
- Phase diagrams: Two-component systems: liquid/liquid and liquid/solid. Three-component systems: Partially miscible liquids. Salting-out.
- Chemical balance: Spontaneous chemical reactions. The effect of temperature and pressure in chemical balance. Acids and bases. ATP thermodynamics.
- Electrochemistry: Thermodynamic properties of ions in a solution. Electrochemical cells: half-reactions and electrodes, normal potentials. Applications: Determination of solubility of constants, measurement of pK and pH.
- Particle movement in gases and liquids: Molecular movement in gases. Transfer properties of ideal gases. Structure of liquids. Molecular movement in liquids. Electrolyte solution conductivity. Ion flexibility. Diffusion.
- Electrochemistry II (applications): Determination of solubility of constants, measurement of pK and pH.

- Chemical Kinetics I: Experimental techniques. Rate of chemical reaction. Laws governing the rate of chemical reaction. Elementary reactions.
- Chemical kinetics II: Consecutive elementary reactions. Monomolecular reactions. Theory of active collisions. Activated complex theory.
- Complex chemical reactions. The chain reaction mechanism. Photochemical reactions. Polymerization reactions. Homogenous catalysis. Autocatalysis.
- Properties of surfaces: Surface tension. Bubbles, cavities and drops. Capillary action. Surfactants.
- Adsorption – Heterogeneous catalysis.
- Colloidal systems: Classification, preparation, structure and stability

Laboratory Part of the Course

The laboratory part of the course will include

- Measurements of temperature, pressure and electric current.
- Ideal and non-ideal values – Entropy of mixing.
- Thermodynamic of an electrochemical cell I: Energy, enthalpy and reaction entropy.
- Thermodynamic of an electrochemical cell II: Cell potential and activity coefficients.
- Vapor pressure (or tension) and vaporization heat of liquids.
- Dimer liquid solutions.
- Balance of solid-liquid phases in a dimer system.
- Balance of liquid-gas phases in a dimer system.
- Distillation of ideal and azeotropic mixtures.
- Properties of colloidals.
- Surface tension of liquids.
- Kinetics of a homogenous reaction.
- Kinetics of a reaction with diffusion.
- Kinetics of a reversible 1st order-reaction.
- Kinetics of a heterogeneous reaction.
- Kinetics of a catalyzed reaction.

EXPECTED LEARNING OUTCOMES

After the completion of the course, students will:

- Be familiar with the laws of Thermodynamics, the ideal and non-ideal values of a system, in order to understand their role in solutions, chemical kinetics and chemical balance.

- Know the properties of liquids and gas solutions as well colloidal systems of dispersion.
- Be able to participate in laboratory exercises and be capable of methodical problem solving.
- Know the various methods for determining liquid surface tension, the structure of colloidal systems, the methods by which they are produced and their stability.
- Comprehend the concept of photochemical chain reactions, chemical balance, as well balance in acid and base hydrolysis, express reaction rates and be able to perform corresponding calculations.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. R.W. Atkins «Physical Chemistry, Volume I», Crete University Press 1998, ISBN:9607309510 (in Greek)
2. I.A Moumtzis "Experimental Physical Chemistry", Ziti Publications, ISBN 9604312863 (in Greek)
3. G.S. Karaiskaki, 1998, "Physical Chemistry 1st Edition", P. Travlos Publications, Patras (in Greek)
4. I. Molinou-Providaki, V. Chavredaki, "Laboratory Exercises of Physical Chemistry A'", University of Athens, Chemistry Department, Athens 2002 (in Greek)
5. V. Chavredaki, I. Molinou-Providaki, "Short Aid for Laboratory Exercises in Physical Chemistry A'", University of Athens, Chemistry Department, Athens 2002 (in Greek)

Foreign:

6. A.M. Halpern "Experimental Physical Chemistry, 2nd ed", Prentice Hall 1997, ISBN: 0136542034.
7. J. M. Smith and H.C. Van Ness, "Introduction to Chemical Engineering Thermodynamics" McGraw Hill, NY, 1987.
8. I. N. Levine "Physical Chemistry", (McGraw Hill 2001).
9. G. W. Castellan, "Physical Chemistry", (Addison - Wesley 1990)
10. R.A. Alberty, R.J. Silbey, "Physical Chemistry", 2nd Edition J.Wiley & Sons Inc.,1997

COURSE SYLLABUS

COURSE TITLE:	**Physico-chemical Changes & Treatments of Wine**
COURSE CODE:	**TO-62**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Specialization Course (SC)**
WEEKLY TEACHING HOURS:	**6 (Theory 3, Laboratory 2)**
CREDITS:	**7,0**
STANDARD ACADEMIC SEMESTER:	**6**

AIM AND OBJECTIVES OF THE COURSE

Through this course, students will acquire the knowledge which will allow them to improve the sensory response to the wines they have produced, at the same time ensuring their biochemical and physical stability. Otherwise inadequate knowledge of the mechanisms and techniques taught in this course can lead to the rapid quality degradation of the wines produced and the complete impossibility of achieving any type of standardization which is desired.

The first part of this course provides the theoretical knowledge to enable students to understand the complex mechanisms both of the maturation and aging of wine, a well as the treatments which precede bottling.

In the last part of this course, students will learn to distinguish the various possible diseases - defects of wine and the mechanisms that cause them.

COURSE SYLLABUS

Theoretical Part of the Course

- The concept of Clarity and Colloidal phenomena. Wine clarity. The colloidal condition of wines. Physico-chemical properties of wine colloidals. Protective colloidals. Use of gum Arabic.
- Interventions and handling for clarification & stabilization of wines. “Fining”. Regarding processing in general. The settlement of suspended particles. Role and practice of post-fermentation racking. The theory of wine fining with the use of proteins. Tannin-protein interaction. The effect of fining on wine characteristics. The concept of over-fining. Products used during fining. Fining technique. Use of bentonite. Various other clarification techniques.

- Wine clarification with filtration and centrifuging. The principle of filtration. The laws of filtration. Assessment of filtration potential of wines. Various materials used as additives during filtration. Filtration with diatomaceous earth. Filtration with cellulose acetate sheets. Filtration with membranes. Tangential flow filtration. The effect of filtration on the sensory characteristics of wine. Centrifuging.
- Stabilization of wines with physico-chemical methods. Stabilization of wines with heat. Use of industrial cooling in stabilization.
- The crystallization & settlement mechanism of tartaric acid salts. Tests for certifying the stability of wines against the settlement of tartaric acid salts. Measures for preventing and avoiding the settlement of tartaric acid salts.
- The technique of ion exchange. Implementation of the electro-dialysis technique in wine making.
- Metal hazes & treatment: Iron and the mechanism of iron haze. Copper and the mechanism of copper haze. Heavy metals.
- Oxidation-reduction phenomena. General concepts. Potential for oxide reduction in wine. Factors affecting the oxide-reduction potential.
- Maturation of red wines. Aging mechanisms. The development of the polyphenolic characteristics of red wines during the oxidation phase of aging. The chemical reactions of polyphenolic compounds during maturation and aging of wines. Reductive aging of red wines. Various procedures & handling of wines during the oxidative aging phase. Effect of type of wood on the development of red wines. Problems that may arise during the oxidative phase of aging.
- Origin, nature and consequences of the main sensory deviations. Oxidation errors. Various bacterial infestations. The microbial origin and chemical properties of volatile phenols. Cork odor. The presence of sulphur derivatives and reductive off-odors. Various other errors and flaws and methods of treatment.

Laboratory Part of the Course

Exercise 1 _____ Control of Wine Oxidation Potential. (Browning & Pinking test).

Exercise 2 _____ Evaluation of various processing materials as regards their capability of offering anti-oxidant protection to wines (Proteins, SO_2, PVPP).

Exercise 3 _____ Protein haze (Bentotest – Heat Test)

Exercise 4 _____ Determination of ideal required quantity of Bentonite to stabilize a wine against protein haze. Evaluation of various bentonite preparations.

Exercise 5 _____ Enzyme determination of tartaric acid.

Exercise 6 _____ Determination of tartaric acid with the method of paper chromatography.

Exercise 7 _____ Metal hazes (Fe^{+++} & Cu+).

Exercise 8 _____ Iron removal.

Exercise 9 _____ Gelatine Index

Exercise 10 _____ BSA Index

Exercise 11 _____ Evaluation of various processing materials as regards their capability of affecting the tannic character of wines.

Exercise 12 _____ Tartaric Stabilization. (Refrigerator test, conductimetry test).

Exercise 13 _____ Control of Wine Filtration Potential.

Exercise 14 _____ Evaluation of various wine packaging materials.

- Study of cork/bottle attachment system.
- Absorbance of UV radiation by glass.

Exercise 15_____ Display of mechanical equipment – Visit to wineries.

EXPECTED LEARNING OUTCOMES

More effective use by students of various means for clarifying wine and familiarization with various processing and wine stabilization techniques.

A more rational approach to the concept of aging and corresponding use of the means required for the best possible guidance of its oxidative phase.

Accurate recognition & treatment of sensory flaws and faults.

BIBLIOGRAPHICAL REFERENCES:

Greek:

1. Stavroula Kourakou-Dragona. “Oenology Subjects”. Trohalia, Athens 1998. ISBN: 960 7809 29 7 (In Greek).
2. Evaggelos Soufleros. “Oenology. Science and Know-how – V 2”. Copyright © 1997 ISBN : 960 9699 1 6 , Set : 960 699 2 4 (In Greek).

3. Argiris Tsakiris. “Oenology. From grape to wine”. Editions Psychalos. Athens 1998. ISBN: 960 7920 8 7 (In Greek).

Foreign:

1. Pascal Ribereau-Gayon, Yves Glories, Alain Maujean, Denis Dubourdieu. "Traite d' CEnologie -(Vol.2) ". Dunod, Paris 1998. ISBN : 2 10 003948 2.
2. Jean Ribereau-Gayon, Emile Peynaud, Pascal Ribereau-Gayon, P.Sudraud. "Traite d' Cnologie -Sciences et techniques du vin -(Vol.4) ". Dunod, Paris 1977. ISBN : 2 04 005182 1.
3. Ron S. Jackson. "Wine science. Principles and applications". Academic Press, Inc. California, 1994. ISBN : 0 12 379060 3.
4. Emile Peynaud. "Connaissance et travail du vin". Dunod, Paris 1981. ISBN : 2 04 011417 3.
5. Les Entretiens Scientifiques Lallemand. "La microbiologie des vins mousseux V 3". Lallemand © Toulouse 1994.
6. Les Entretiens Scientifiques Lallemand. "Fermentation Technology V 2". Lallemand © Toulouse 1994.
7. Hans R. Luthi et Ulrich Vetsch. "Analyses et Appreciation Microscopiques de vins et jus de fruits dans la pratique", Collection Avenir Cnologie.
8. Roger B.Boulton et al. "Principles and practices of winemaking", Aspen Publishers Inc., New York, c1996, ISBN : 08342 127 06.
9. Bruce W. Zoecklein et al. "Wine analysis and Production", Chapman & Hall, New York, c 1995, ASIN : 041 298 2412.
10. Kenneth C. Fugelsang. "Wine Microbiology", Aspen Publishers Inc., New York, c1997, ISBN : 04120 661 14.
11. Cornelius S. Ough. 'Winemaking basics", Haworth Press, New York, 1991, ISBN : 15602 200 58.
12. Richard P. Vine et al. "Winemaking : From grape growing to marketplace", Chapman & Hall, New York, c 1997, ISBN : 083421699x.
13. David R. Storm. "Winery utilities : planning, design and operation", Aspen Publishers Inc., New York, c1997, ISBN : 08342 198 16.
14. Gerhard Troost. "Technologie des Weines". Ulmer, Stuttgart 1988. ISBN : 3 8001 5816 7
15. Andre Brugirard. "Aspects Pratiques du Collage des Mouts et des Vins". Oenoplurimedia s.a.r.l., Chaintre 1997, ISBN : 2 905 428 11 2.
16. Bernard Gautier. "Practical Aspects of Wine Filtration". Oenoplurimedia s.a.r.l., Chaintre. Collection Avenir Cnologie.
17. Joel Rochard. "Aspects Pratiques des Traitements Thermiques des Vins". Oenoplurimedia s.a.r.l., Chaintre. Collection Avenir Cnologie.
18. J.M.Riboulet. "Practical Aspects of Wine Corkage". Oenoplurimedia s.a.r.l., Chaintre. Collection Avenir Cnologie.
19. Hans R. Luthi et Ulrich Vetsch. "Analyses et Appreciation Microscopiques de vins et jus de fruits dans la pratique", Collection Avenir Cnologie.

COURSE SYLLABUS

COURSE TITLE:	**Vine Plant Protection**
COURSE CODE:	**TO-53**
COURSE TYPE:	**Theoretical, Laboratory**
COURSE CATEGORY:	**Course of Special Structure (CSS)**
WEEKLY TEACHING HOURS:	**5 (Theory 3, Laboratory 2)**
CREDITS:	**6,0**
STANDARD ACADEMIC SEMESTER:	**5**

AIM AND OBJECTIVES OF THE COURSE

The course introduces students to the basic concepts and principles of plant protection, and equips them with the necessary knowledge to predict, identify and treat pests and diseases of the vine with modern methods, in order to produce high quality healthy grapes, applying advanced techniques of plant protection, and also taking into account the protection of the environment.

COURSE SYLLABUS

Theoretical Part of the Course

- **Vine diseases:** Fungal, prokaryotic, viral and non-infectious diseases. Description of symptoms, etiology, biology and ecology of pathogens, as well as the epidemiology and control of corresponding diseases.
- **Vine pests:** Morphology, biology, ecology, symptoms of vine pests: types of damage, economic importance, methods and means for controlling vine pests (Black fly, phylloxera, scale insects, cicadellidae, otiorhynchids and other leaf eating and wood eating coleoptera, vine moths and other Lepidoptera, diptera). Morphology, biology, symptoms, ecology and control of nematodes (optional parasites, mandatory ectoparasites, mandatory ecto-endoparasites, mandatory endoparasites), mites and rodents.
- **Prediction:** Infestation prediction models. Control and sampling techniques. Methods for protection of plant production.
- **Plant protection:** Chemical plant protection. Pesticides (history, classification). Pesticide preparations (forms, ingredients, standardization). Laws on pesticides. Viral activity of pesticides (mechanisms, selectivity). Use of pesticides (selection, application, precautions, problems). Pesticides and the environment (residues and factors affecting residual pesticides left on the grape, in soil and in water).
- **Integrated control:** Pesticides and combined control. Principles and strategies of integrated control. Epidemiological information and analysis of basic principles for the successful and economic decrease of damages from pests and diseases. Cultivation measures for decreasing damages. Disease control with resistance varieties. Genetic control and interaction mechanisms of host-pathogen.
- **Organic control:** Organic protective products. Organic control of pests and diseases. Beneficials and their biology.

Laboratory Part of the Course

- Diseases caused by fungi: Downy mildew, oidium, botrytis, eutypata, excoriose, esca, Petri's disease.
- Diseases caused by bacteria: Vine cancer, xylophilus ampelinus, Sour rot, Pierce's disease.
- Diseases caused by viruses: Grapevine fanleaf virus, leaf curl virus, spotting, chlorosis, black wood, vein necrosis.
- Pests – Mites: Blister mite, vine acariasis, tetranychus.
- Pests – Insects: Phylloxera, grape moth, scale insects, eye worm, otiorhynchid, cicadillidae, black fly.
- Selection of pesticides, transport and storage, preparation and application of spraying liquid or dust, actions after their application and first aid.
- Visits to vineyards for on-site macroscopic identification of symptoms and microscopic observation of the various pathogens causing them.

EXPECTED LEARNING OUTCOMES

After the completion of the course:

- Students will be familiar with modern models for prediction of infestation and methods of protection from the various pathogens, and will be able to apply the most appropriate one.
- Students will be familiar with the biology and symptoms of the various vine pathogens and will be able to select the best method for treating them.
- Students will be familiar with the chemical composition and effectiveness of various pesticides and will be able to select the most appropriate ones for each case.
- Students will be familiar with the advantages and disadvantages of the various control systems implemented today in viticulture, and be in a position to judge which to implement depending on the destination of the produced product.

BIBLIOGRAPHICAL REFERENCES:

Greek:

18. ROUBOS I. (2003): **Diseases and Pests of the Vine.** Editions STAMOULI, Athens, ISBN 9603514411 (In Greek).
19. HOFMANN U., KOPFER P., WERNER A. (2003): **Viticulture – organic farming.** Editions PSYCHALOU, Athens, ISBN 9608336104 .

Foreign:

20. HILLEBRAND,W., LORENZ, D., LOUIS, F. (1998): **Rebschutz.** Fachverlag Dr. Fraund, Mainz, ISBN 392115636x.
21. PEARSON, R.C., GOHEEN, A. C. (1988): **Compendium of Grape Disease.** Amer. Phytopathological Society, ISBN 0890540888.

8 PRACTICAL TRAINING GUIDE

Prerequisites for starting Practical training:

- Successful completion of 2/3 of the total number of Courses, i.e. 27 Courses.
- Up to 2 Specialization Courses may be incomplete (highlighted).
- It should be remembered that where the course is composed of both Theoretical and Laboratory parts, both parts must have been successfully completed.

A/A	A' Semester Courses
TO-11	General and Inorganic Chemistry
TO-12	Applied Mathematics and Statistics
TO-13	Applied Informatics
TO-14	Physics
TO-15	Introduction to Wine and Beverage Technology
TO-16	Plant Biology

A/A	B' Semester Courses
TO-21	Organic Chemistry
TO-22	Quantitative Chemical Analysis
TO-23	Physical Chemistry
TO-24	General Microbiology
TO-25	Morphology & Physiology of the Vine

A/A	C' Semester Courses
TO-31	Biochemistry
TO-32	Soil-Climate System & the Vine
TO-33	Raw Materials of Alcoholic Beverages
TO-34	Physical Processes
TO-35	Wine and Must Composition & Analysis
TO-36	Principles of Financial Science

A/A	D' Semester Courses
T0-41	Wine Microbiology
TO-42	Biotechnology & Industrial Fermentations
TO-43	Vine Culture
TO-44	Basic Winemaking Techniques/Technologies
T0-45	Quality Management

A/A	E' Semester Courses
TO-51	Instrumental Chemical Analysis
TO-52	Special Winemaking Techniques/Technologies
TO-53	Vine Plant Protection
TO-54	Ampelography
TO-55	Technology & Analysis of Distillates

A/A	F' Semester Courses
TO-61	Business Administration
TO-62	Physico-chemical Changes and Treatments of Wine
TO-63	Waste Treatment
TO-64	Aromatic Substances of Wines
TO-65	English/French for Specific Purposes
TO-EY	Selection 1 (see following Table)
TO- EY	Selection 2 (see following Table)

A/A	G' Semester Courses
TO-71	Technology of Malting and Brewing
TO-72	Marketing of Wine & Beverages
TO-73	Wine & Beverages Legislation
TO-74	Sensory evaluation of Wine and Beverages
TO-EY	Selection 3 (see following Table)
TO-EY	Selection 4 (see following Table)

ELECTIVE COMPULSORY COURSES (Semesters F' and G')	
TO-EY1	Packaging of Wine and Beverages
TO-EY2	Wine Tourism Management
TO-EY3	Applied Enzymology
TO-EY4	Technologies for Use of By-products
TO-EY5	Sales Techniques for Wine and Beverages
TO-EY6	Seminar & Essay Presentation Techniques
TO-EY7	Professional Ethics
TO-EY8	Design of Industries

9 DISSERTATION HANDBOOK

The dissertation is a study of a specialized subject in science and technology and encourages students to develop initiative and creativity in an independent manner, which is not possible through the usual methods of teaching and learning, and may require, further to bibliographic review & investigation, experimental work such that the acquired knowledge is applied to an actual problem.

A scientific paper must be original and not just a summary of others. It is not a text that simply paraphrases other writings. It should be a documented presentation of the author's perspective on a specific subject.

The dissertation may deal with any aspect of industrial or business activity and include research, development, planning, production, market research, etc.

A dissertation, with regard to the work load, is equivalent to four (4) theoretical courses, i.e. 20 credits.

The dissertation is personal for each student, and only if the experimental part of a research paper demands it, it may be assigned to a team of two (2) persons, at the discretion of the supervising professor.

The supervisor is either a member of the Department's teaching staff or a scientific or in special cases a laboratory associate of the Department.

The student (or team of students) is responsible for the dissertation. In particular the student determines how the subject will be studied, designs the methodology and executes the experimental work, analyzes and evaluates the findings from the literature as well as the experimental results and extracts valid conclusions.

The supervisor has a guiding role to ensure that the paper follows the right direction, but in no case can the help be such that the result could be considered the supervisor's work. The supervisor is also responsible for securing the necessary material and technical facilities.

The student should consider the supervisor as a consultant and instructor, and should inform him about the progress of the dissertation at all times.

The time of commencement of the dissertation is the date of approval of the joint statement, submitted by the student(s) and the supervising Professor and is approved by the competent Course Domain of the Department.

The time available for preparing the dissertation, as specified by the Department's program, **is one (1) academic semester** and can be extended only in special cases and after an application by the Supervising Professor to the Department Council. If it has not been completed within this time, the student must begin a new dissertation.

Following approval by the supervising Professor, one (1) copy of the dissertation is submitted in printed form to the Department Council so that an evaluation committee and the date of the presentation can be determined. Each member of the evaluation committee receives one copy.

The date of presentation of the dissertation cannot be at a time less than five (5) weeks from the graduation date, and in any case, it cannot be during the examination periods of the winter and spring semester.

After the presentation of the dissertation and any necessary corrections suggested, four (4) copies are submitted to the Department, and the decision and full names of the members of the evaluation committee must be mentioned on the second page. Also, one (1) CD of the dissertation in electronic format (PDF file) must also be submitted.

A) Literature review dissertations

Literature reviews are reviews of a subject and should be comprehensive and critical descriptions of recent knowledge or technological progress in a subject.

Students are free to organize the paper as they please (chapters, paragraphs) taking into account the instructions contained in this document.

The balanced presentation of knowledge and its individual elements, with criticism with regard to positive and negative points, and with possible expression of personal opinions which should be supported by the text, is of great significance in a literature review dissertation.

B) Research dissertations

Research dissertations include an experimental part, its extension and length determined by the supervising professor, in cooperation with the student(s), and it can be of broader interest or otherwise, depending on the objective of the dissertation.

Research dissertations are based on a preliminary literature research of the subject and proceed to the implementation of either new or already known, but important, modified techniques and methods.

The reliability of the presented experimental results and the conclusions deduced from them, are the important part of a research paper.

How to Write a Dissertation

The text of the dissertations cannot be less than 12000 words in length. The maximum length, together with the tables and figures, will be determined in cooperation with the supervising professor.

Dissertations must be printed on white A4 paper and the margins must be: inner: 30mm, outer: 20mm and up/down: 25mm.

Preliminary pages are numbered with Latin numerals (i, ii, iii, iv...), with the front cover being number i (not printed on it), regular pages with Arabic numerals (11, 12, 13, 14...) and annexes in the form of e.g. II-3. Page numbers should be placed on the lower part of the page.

Dissertations must be bound with heat sealing and the front and back covers can be colored, as long as they remain legible.

The monotonic accentuation system is used for writing the dissertation, in simple demotic language, and any text processor can be used, e.g. MS Word 97 or newer, Open Office Writer 3, Softmake Office, AbiWord, as long as it can be saved in electronic format as a ".doc" file.

A legible commonly used font should be used (e.g. Arial, Tahoma, Mg New Times, Lucida Sans) with font size for plain text 11 or 12pt, normal, and for titles 12 or 14 pt, possibly in bold.

Line spacing should be equivalent to 1.5 lines.

Italics are used **ONLY** when scientific names of microorganisms, plants and animals are mentioned.

No underlining should be used in the text, unless absolutely necessary.

Footnotes should be kept to the minimum, and where they are used the * or † symbols are used.

Word abbreviations are to be avoided.

Pronouns, such as 'I", "we" "**our** results", "**my** sample", "**our** diagram" etc. are **NOT** to be used.

The third person singular should be used, and particularly for experimental papers, the past tense in the third person singular ("It was observed that the speed of the reaction was a function of the pH").

Tables

Tables should be placed inside the text. They should be numbered with Arabic numerals depending on the chapter and their order of presentation in the text, e.g. Table 3.5 and the **title placed on the top of the table - NOT AT THE BOTTOM.** The table's columns and lines should not create a problem when reading it.

If the table width is too large, is should be presented in landscape layout with regular font size, even if it requires a separate page, and not in portrait layout with very small font size.

Figures (including diagrams and photographs)

Figures should be placed within the text. The title should be on the lower part of the figure or photograph, **NOT ABOVE IT.** They are numbered in the same way as tables, e.g. Figure 2.16.

Mathematical and chemical equations

They are written in a separate line of the text and are numbered (in parenthesis) according to the corresponding chapter and their order of presentation in the text, e.g. " was found to follow the equation:

$$\mu = \mu_{max} (S/K_S + S) \qquad (6.10)$$

where: μ = ...»

Units, Symbols & Nomenclature

Units and symbols of the International System of Units (SP) should used. The nomenclature follows the rules and suggestions of the International Union of Pure and Applied Chemistry (IUPAC), International Union of Biochemistry (IUB), International Union of Pure and Applied Physics (ΠΙΡΑΡ).

The cases of information derived from the literature are an exempted, where the original expression is used (e.g. legal).

Abbreviations and acronyms

They should be avoided in general. If there is need to use any, a glossary should be presented in the beginning of the dissertation explaining all abbreviations, symbols and technical terms mentioned in the dissertation (e.g. UN = United Nations).

Method of organization of dissertations

1 Front cover

The front cover should follow the attached example and include:

- Title
- Full name of the student(s)
- Full name and rank of the supervising professor
- Name of laboratory
- Date of submission.

a. Title.

The title is that mentioned in the approval granted by the corresponding course domain or the Department Council. A slight modification of the title, which has already been submitted and approved by the Course Sector and the Department Council, may be made ONLY after reaching an understanding with the supervising professor.

b. Name.

The title is followed by the name or names of the student(s) in alphabetical order. Last names are written first, followed by first names.

c. Name of laboratory

The laboratory where the dissertation was prepared. The name of the laboratory may also be written under the name of the Department (see example). It is not included in the case of literature review dissertations.

2 Second page

The second page must include everything included in the first page, and also the decision of the evaluation committee and the names of the members of the evaluation committee. Alternatively, only the decision and the names of the evaluation committee may be included.

The full names of the evaluation committee are mentioned in strict alphabetical order of surname, which precedes the first name, with the exception of the chairman of the committee, who is mentioned first.

3 Summaries

Summaries of the dissertation **in Greek** and **in English** are presented in the next page, and they should not exceed a total of one page in length.

Given that the summary is the part of the dissertation usually read first and foremost by readers, it should be comprehensive, coherent and refer to the basic findings or results or points of the dissertation. If research results are presented, THE EXPERIMENTAL METHODOLOGY SHOULD NOT BE MENTIONED IN THE SUMMARY UNLESS IT IS AN OUTCOME OF THE DISSERTATION.The summary in English should be an accurate translation of the summary in Greek.

4 Content

5 Introduction

The introductory material must be limited to what is suitable for the subject, so the reader can logically follow the purpose of the dissertation, the problems and issues raised and the approach followed.

If deemed necessary, there shall be an introduction of prior knowledge and literature with the appropriate reference to the source. In these cases the material **IS NOT SIMPLY TO BE COPIED.**

IN NO CASE SHOULD REFERENCES TO OTHER AUTHORS NOT USED IN THE SPECIFIC DISSERTATION BE COPIED. References should be as recent as possible.

6 Materials & Methods (only for research papers)

This part includes a detailed description of the equipment used and reference to the materials and the methods (e.g. sampling, maintenance and analysis of samples, statistical processing of results) followed during the experimental procedure with the corresponding bibliographical support. Often, at least one diagram of the experimental instruments is necessary.

The information provided should be adequate, such that anyone reading the dissertation can repeat the process.

7 Results (only for research papers)

All experimental results and observations about the experimental procedure together with a critical discussion are recorded in this part. The relevant tables and images are also included.

The initial experimental data, if numerous, should be included in the annexes. The same applies for calculations that are repeated.

IT IS FORBIDDEN TO PRESENT THE SAME DATA & INFORMATION IN DIFFERENT FORMS, e.g. a table and a diagram with the same data.

Diagrams and tables should have the type and amount of information to enable the reader to understand what they refer to and how they are connected to the text.

8 Discussion & Conclusions

After the results and the discussion, any conclusions arising may be presented, but only when this is deemed useful or when they arise from the previous discussion but are not included in it.

9 Bibliography

Bibliographical references within the text of the dissertation should be kept to a minimum, given that they are sufficient in order to fully support the text, and should be included in the text every time it is necessary by writing the name of the authors and the year of publication in parentheses e.g. (Jones L.T., 2003).

If there are two authors, both names are included. If there are more than two authors then only the name of the first author is written, followed by “et al".

The bibliographical references are all included in the bibliography section in strictly alphabetical order and are separated based on language, into Greek and foreign, in separate lists.

References with the same author(s) are listed in consecutive chronological order. Specifically, if two or more references by the same authors pertain to the same year, a letter is added after the year, in the order: a, b, c, …, e.g. (Ioannou N.G and Georgiadis P.K. (1994a)…., Ioannou N.G. and Georgiadis P.K. (1994b)…

References should follow the form:

A. Article in scientific journal

Liang, Y. et al. (1997). Research on the characteristics of start up and operation of treating brewery wastewater with an AFB reactor at ambient temperatures. Water Sci Technol **28**(7), 187.

B. Books

Hubbard, M. (1990). "Statistical quality control for the food industry", New York: Van Nostrand Reinhold.

C. Book chapters

Bernard, C. (1997). Pesticide use. In Agricultural Resources and Environmental Indicators (M. Anderson, ed.). USDA ERS, Agricultural Handbook.

D. Bulletin

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E. Papers Presented at Conferences

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REGARDLESS OF THE NATURE OF THE DISSERTATION (RESEARCH - LITERATURE REVIEW) THE METHOD OF PRESENTATION OF THE BIBLIOGRAPHICAL REFERENCES IS THE SAME.

BIBLIOGRAPHICAL REFERENCES USED IN THE DISSERTATION MUST BE INCLUDED IN THE BIBLIOGRAPHY

10 Annexes

Annexes include data and other material that is not directly necessary for understanding the text (images, statistical tables, calculations, etc).

APPLICATION FOR PREPARATION OF A DISSERTATION

TO
The Department of Oenology & Beverage Technology of the T.E.I. of Athens

Student details

Student's full name .....

Registration Number.....

Address .....

Telephone ..... Mobile .....

E-mail .....

Team Project YES □ / NO □

In case of a team project, please complete the following:

Student details

Student's full name .....

Registration Number.....

Address .....

Telephone ..... Mobile .....

E-mail .....

Details of Supervising Professor

Professor's full name .....

Telephone ..... Mobile .....

E-mail .....

Title .....

Suggested start date of dissertation preparation

Signature of Professor	**Signature of Student**	**Signature of Student**
.....	.....	.....

APPLICATION FOR EXTENSION OF A DISSERTATION

TO
The Department of Oenology & Beverage Technology of the T.E.I. of Athens

Details of Supervising Professor

Professor's full name .....

Telephone .....Mobile .....

E-mail .....

Student details

Student's full name .....

Registration Number.....

Team Project YES □ / NO □

In case of a team project, please complete the following:

Student details

Student's full name .....

Registration Number.....

*Start date of dissertation preparation .....

***mandatory field**

Title .....

Justification for extension: .....

Signature of Professor	Signature of Student	Signature of Student
.....	.....	.....