ANNEX 2 – COURSE DESCRIPTION

Course Title	**Biochemistry and Molecular Biology**				
Course Code	ABF 502				
Course Type	Theory and Laboratory				
Level	Master				
Year / Semester	Fall Semester/1st Semester/1st year				
Teacher's Name	Dr. Nikolaos Nikoloudakis				
ECTS	8	Lectures / week	2x1.5hrs	Laboratories / week	3hrsX1 group
Course Purpose and Objectives	The aim of the course is to gain a unified background in Biochemistry and Molecular Biology as students come from different fields. Moreover, the course aims to develop combinational thinking between theory and techniques of biochemistry and molecular biology, as well as to apply their basic knowledge in practice, to participate in an interdisciplinary environment and to develop synthetic and inductive thinking.				
Learning Outcomes	After the fulfillment of the subject, students are expected to: 1. Study bibliography related to the structure and organization of the genome, the metabolic procedures of DNA and RNA, the gene expression regulation and the biochemical structures/ functions of an organism at the molecular level. 2. Be able to perform laboratory biochemistry and molecular biology techniques that will be taught in the laboratory part of the course, as well as analyze and describe the results of laboratory exercises. 3. Be able through independent work, to find and study the literature in order to present a topic of their choice related to the subject of the course. 4. Link the obtained theoretical background with techniques used for biomolecule isolation and analysis in order to be able to solve problems in experimental processes.				
Prerequisites	None	Required	None		
Course Content	1. Introduction (the –omics era) 2. Nucleic acids 3. Replication and DNA repair 4. Transcription and RNA maturation 5. aminoacids- Protein structure 6. Protein synthesis 7. Regulation of gene expression 8. Carbohydrates 9. Lipids 10. Energy metabolism 11. Assignments presentation				

	Laboratory exercises 1. Introduction 2. Preparation of different solutions based on Molarity, %w/w and %w/v, consecutive dillutions, graphing data and statistical analysis 3. Spectrophotometry 4. DNA extraction and spectrophotometric analysis 5. Agarose electrophoresis 6. Protein extraction, Bradfrord and Lowry assays 7. Column chromatography 8. SDS-PAGE 9. Thin layer Chromatography 10. Enzyme kinetics 11. Qualitative determination of sugars 12. Lipid analysis 13. Flow cytometry
Teaching Methodology	Power Point presentations Active participation in learning activities, conversation, and questions Laboratory exercises Assignments
Bibliography	1. Tutor's notes 2. Lehninger Principles of Biochemistry Seventh Edition by David L. Nelson, Michael M. Cox ISBN-13: 978-1464187964, ISBN-10: 1464187967 3. Molecular Cell Biology Eighth Edition by Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Kelsey C. Martin. ISBN-13: 978-1464183393, ISBN-10: 1464183392
Assessment	Students will be assessed using a multifactorial system: Final examination (theory): 60% Final examination (laboratory): 20% Assignment: 20% Examination tests include closed type questions (multiple choice, gap-fill, matching etc), open-ended questions, composite questions, and problem solving questions that critically evaluate the accomplishment of the aforementioned results.
Language	Greek (English terminology is provided for the common used biochemical and molecular biology terms)

Course Title	**Bioeconomy – Biosafety – Bioethics**				
Course Code	ABF 503				
Course Type	Theory				
Level	Postgraduate				
Year / Semester	Fall Semester/1st Semester/1st year				
Teacher's Name	Dr. Iakovos Pantelides				
ECTS	7	Lectures / week	2 x 2 hrs	Laboratories / week	
Course Purpose and Objectives	This course aims to provide students with an understanding of the concept of bioeconomy, by presenting the current situation and trends of the bio-based economy. It also aims to explore the European Union's initiatives for developing biotechnology and thereafter bioeconomy and analyses biosafety issues which are emerging towards a "Bio-Economically Developing Society". The objective of the Biosafety course is to explore ways for identifying, assessing and controling environmental, food and farming units' safety by using examples of genetically modified organisms-food, cloning issues, genomic research and gene manipulation. Ethical decision-making issues are discussed within the Agricultural Bioethics research.				
Learning Outcomes	After the fulfillment of the subject, students are expected to be able to analyze the technologies and approaches contributing to a sustainable bioeconomy and critically evaluate the restrictions and opportunities provided by global policies and economic trends. Students will be able to analyze the ethical and philosophical underpinnings of bioethics by using the right terminology, vocabulary and objectives of Biosafety. use the appropriate tools and approaches needed to make a bioethical decision in the major issues being discussed in agricultural bioethics today. Through the Biosafety topics discussed in the course students will be able to identify potential hazardous biological materials and the risks associated with them and select appropriate means to minimize risk and to protect against or prevent exposure by presenting examples with microorganisms in laboratories, but also genetically modified organisms. communicate effectively within a group and organize their time within the group, so they can work together to gather the necessary data to support their position on a predetermined topic relevant to the module in the form of debate. In addition, by				

	doing autonomous work students should be able to study bibliography and make a presentation on a subject of their choice relevant to the course.		
Prerequisites	NA	Required	NA
Course Content	LECTURES • Principles and Concept of the Bioeconomy. • Present situation and trends in Bioeconomy. • Bioeconomy in the European Union. • Biotechnology and Bioeconomy • Basic concepts and principles of Bioethics. • Theoretical and Applied Bioethics. • Main considerations regarding applications of plant biotechnology. • The moral use of Genetically Modified Organisms (GMOs). • Bioethics in Agricultural Research. • National Bioethics Committee - Application procedure for bioethical evaluation of research protocols. • Genetically Modified Organisms in Cyprus - Policy and Legislation • Introduction to Biosafety. • Biosafety - Recognition of Risks, Risk Assessment and Control.		
Teaching Methodology	Lectures. Active participation in learning activities, discussion and resolving questions. Individual oral presentations of recent publications in scientific journals that are related to Bioeconomy, Biosafety or Bioethics. Teamwork debate on a predetermined topic. Individual meetings for assay guidance and problem solving. Independent study using the provided literature and reliable internet sources.		
Bibliography	(1) Teacher's Course Presentations (in Greek). (2) European Commission (2018). A sustainable Bioeconomy for Europe. Strengthening the connection between economy, society and the environment. Updated Bioeconomy Strategy. Luxembourg: Publications Office of the European Union — 103 pp. — ISBN: 978-92-79-94145-0, doi: 10.2777/478385.		

	(3) Fossey A. (2007) *Bioethics in Agricultural Research and Research Management*. In: Loebenstein G., Thottappilly G. (eds) Agricultural Research Management. Springer, Dordrecht (4) Kircher, M. (2012). The transition to a bio-economy: national perspectives. Biofuels, Bioprod. Bioref., 6: 240–245. (5) Lewandowski, I. (2018) *Bioeconomy: Shaping the Transition to a Sustainable, Biobased Economy*, Springer International Publishing, ISBN: 978-3-319-68151-1, doi: 10.1007/978-3-319-68152-8 (6) Prasad Saripalli, H. K. R., et al. (2012). Bio-economy: novel policy design through biotechnology. International Journal of Integrative sciences, Innovation and Technology, 1 (1): 61-66. (7) Sateesh M.K. (2008) Bioethics and Biosafety. I.K. International Publishing House Pvt. Ltd. ISBN-10: 9788190675703. (8) Thieman, W.J. and Palladino M.A. (2018) *Introduction to Biotechnology*, 4th Edition, ISBN-13: 978-0134650197 (9) Wesseler, J., & Aerni, P. (2011). Sustainability and the bio-economy. AgBioForum, 14(3): 94-96. (10) World Health Organization. (2004). *Laboratory biosafety manual*, 3rd ed. World Health Organization. https://apps.who.int/iris/handle/10665/42981.
Assessment	Final Examination: 60% – Tests include close-ended questions (multiple choice, fill-in, matching, etc.), short answer and full essay questions. The test contains knowledge questions and questions that the student needs to combine knowledge gained from the course. Individual Presentation: 20% – The subject is of the student's choice and is relevant to the purpose and content of the course. Teamwork debate: 20% – Students are divided in two teams, they study the subject of the debate and each team defends its position based on actual data and / or bibliographic references in the form of a debate.
Language	Greek (English terminology is provided for all common terms of Bioeconomy, Biosafety and Bioethics)

Course Title	**Special Topics in Microbiology**				
Course Code	ABF 501				
Course Type	Theory and Laboratory practicals				
Level	Postgraduate				
Year / Semester	Fall Semester/1st Semester/1st year				
Teacher's Name	Dr. Dimitris Tsaltas and A. Hatzilouca (special scientist-part time collaborator)				
ECTS	8	Lectures / week	1 x 3hr	Laboratories / week	1 x 3h
Course Purpose and Objectives	The purpose of the course is to provide students of the Master program in Agricultural Biotechnology, who are from different field of studies, with the necessary background so that they can follow other courses of the program where microbiology is an essential background (Biotechnology, Advanced Molecular Biology Techniques). At the same time, the course provides the student with expertise and special skills in research fields of food microbiology and agricultural microbiology.				
Learning Outcomes	After the fulfillment of the course, students are expected to be able to: apply the microbiology background and their skills of searching data to resolve problems in occurring in new or unfamiliar environments associated with agricultural microbiology and biotechnology. search, analyze and synthesize data from bibliography and experiments, develop critical thinking and be able to take decisions on issues related to microbiology and its applications in biotechnology. carry out autonomous and team work on specific microbiology topics related to agronomic biotechnology and will be responsible for safety and health issues during laboratory handling of microbiological specimens.				
Prerequisites	none	Required	none		
Course Content	**Theory lectures** 1. Introduction I. 2. Introduction II 3. Cellular structure and function • Cell shape and size				

- Cell membranes
- Cell walls
- Other cellular structures
- Microbial movement

4. Nutrition, cultivation and microbial growth
   - Microbial nutrition and its chemistry
   - Substrates
   - Laboratory culture
   - Microbial growth
   - Measurement of microbial growth
   - Temperature and microbial growth
   - Other environmental factors that affect growth
   - Cell division

5. Control of microbial growth
   - Sterilization
   - Antibiotics

6. Molecular Biology and Genetics of Bacteria
   - Genetic material (chromosomes and plasmids)
   - Testing for gene expression
   - Mutations
   - Gene transfer

7. Genetic Engineering
   - Methods of handling DNA
   - Gene cloning

8. Microbial Evolution and Systemic

9. Methods in microbial ecology
   - Cultivation techniques
   - Independent cultivation techniques

10. Catalysis of organic substances
    - Fermentation

	• Anaerobic respiration 11. Biofilm 12. Soil microbiology • Plant Growth Promoting Rhizobacteria 13. Nutrient Cycles, Biodegradation and Biodegradation 14. Symbiotic relationships **Laboratory Practicals** 1. Group division, lab and equipment demonstrations, general guidlines 2. Introduction to the Laboratory of Microbiology 3. Substrates, aseptic techniques 4. Identification of microorganisms, Gram staining 5. Counting of micro-organisms 6. Counting of micro-organisms in food and animal feed 7. Control of microbial growth (heat) 8. Control of microbial growth (UV radiation) 9. Sugars catabolism test 10. Fungi 11. Yeast 12. Antimicrobials 13. Revision, comparison of results and discussion
Teaching Methodology	Lectures Laboratory exercises Active lifelong participation in learning activities, discussion and querying Teamwork in laboratory exercises Individual meetings for guidance and querying Individual assignment reviewing the bibliography, slide and oral presentation
Bibliography	1. Slides of lecturer (MOODLE) 2. Brock Microbiology of Microorganisms (2018) (Greek Translation 14th Edition. Brock Biology of Microorganisms, Michael Madigan, John Martinko, Kelly Bender, Daniel Buckley, David Stahl) ISBN 978-960-524-523-8 QR41.2 .B7615 2018

	3. Microbial Physiology (2002). Albert G. Moat, John W. Foster and Michael P. Spector, WILEY-LISS, ISBN: 978-0-471-39483-9, Library Ref # QR84 M64 2002 4. Molecular Genetics of Bacteria. Larry Snyder and Wendy Champness. ASM Press. ISBN 1-55581-102-7 5. Fungal Physiology. David H. Griffin. 2nd Edition, Wiley-Liss. ISBN 0-471-59586-1 6. Fungal Biology. J.W. Deacon. Wiley-Blackwell 4th Edition 2005. ISBN 978-1405130660
Assessment	Laboratory Exam 30%, Assignment and Presentation 30% και Final Exam 40%
Language	Greek

Course Title	**Postgraduate Seminars**				
Course Code	ABF 512				
Course Type	Lectures/Seminars				
Level	Postgraduate				
Year / Semester	Autumn Term/1st semester or 3rd semester/1st year or 2nd year				
Teacher's Name	Dr. Dimitris Tsaltas				
ECTS	2	Lectures / week	1 x 2hr	Laboratories / week	
Course Purpose and Objectives	The course aims to train new MSc and PhD scientists with skills in communication (oral, written and electronic), and on topics such as workplace behavior, teamwork, supervision, human resources management and ethics in the professional area. Additionally, seminars aim to provide young scientists with skills that will enhance their chances of being employed in academia or industry. At the same time, this course will serve as an information platform where visiting scientists give lectures on agricultural sciences, food science, biotechnology, innovation and entrepreneurship.				
Learning Outcomes	Learning the basics of communication, work relations, scientific writing. Decision making Exercising critical thinking Promoting free, creative and inductive thinking				
Prerequisites	none	Required	none		
Course Content	1. Communication skills 2. Creating Powerpoints 3. Presentation skills 4. Training programs 5. Interview 6. CVs and Letters 7. Teamwork 8. Supervision and Leadership				

	9. Professional Behavior 10. Work ethics and research 11. Conflict management 12. Innovation 13. Green entrepreneurship 14. Crisis communication 15. Selecting a PhD Lab 16. Laboratory management 17. Writing of scientific publications 18. Management of bibliographic data Series of seminars provided by visiting experts
Teaching Methodology	Lectures/Seminars Active participation in learning activities, discussion and querying Individual meetings for guidance and querying
Bibliography	At the Helm. A laboratory navigator. Kathy Barker, Cold Spring Harbor Laboratory Press Communication skills for engineers and scientists. 4th Edition IChemE Lab Dynamics. Management Skills for Scientists. Carl Cohen, Suzanne Cohen, Cold Spring Harbor Laboratory Press
Assessment	Not evaluated - The only requirement is physical presence and participation
Language	Greek

Course Title	**Experimental design and biostatistics**				
Course Code	ABF 509				
Course Type	Theory and Labs				
Level	Graduate and Ph.D. candidates				
Year / Semester	Fall Semester/1st Semester/1st year				
Teacher's Name	Dr. Andreas Katsiotis				
ECTS	7	Lectures / week	2 x 1.5hr	Laboratories / week	1h
Course Purpose and Objectives	The purpose of the course is to train postgraduate students and doctoral candidates in biometrics and agricultural experimentation methodologies necessary for their research. Statistical methodologies in biological sciences are presented as well as specialized agricultural experimentation designs (simple and factorial experiments), as well as introduction to non-parametric data analysis. The course aims, on one hand, to develop skills in biostatistics and practical applications (to design, execute, analyze data, and interpret biological results), and on the other hand to use software to facilitate the management of large numbers of data. This course introduces the main data analysis methodologies, 'lost value' management, the use of cross-correlation analysis, and data visualization capabilities.				
Learning Outcomes	Upon successful completion of the course, students will be able to design and analyze an experiment and explain the outcome of their research results. Upon completion of the course students are also expected to be able to take decisions for designing and implementing an experiment. They will also be able to decide which experimental design they should use and their options and capabilities for statistical analysis of data. At the same time, they will acquire practical skills, perform statistical analyzes and critical thinking on the biological significance and interpretation of their results. Finally, they will be able to present the results of the experiment in a form suitable for disseminating the results to the scientific community.				
Prerequisites	-	Required	-		
Course Content	**Introduction** • Basic concepts and definitions of biostatistics • Quantitative and qualitative variables • Presenting statistical results **Population structure and distributions**				

- Mean, variance, standard deviation, median (examples)
- Discontinuous or discrete distributions (binomial, Poisson, etc)
- Continuous distributions (normal, logarithmic, *t* distribution, *χ2*, F distribution)
- Conversions
- Standardization of Normal distribution

T-test

- Hypotheses (H_0 and H_A)
- 2-sample *t-test*
- one sample *t-test*
- paired *t-test*

χ2

- χ^2 test for associations
- χ^2 test for differences

Introduction to agricultural experimentation

- Agricultural experimentation procedures
- Experimental error
- Replication
- Randomization
- Experimental field

Experimental designs

- Completely Randomized Design (CRD)
- Randomized Complete Blocks (RCB)
- Latin Square (LT)
- Sub-sampling

Comparisons

- Pair comparisons
- Group comparisons (LSD, Duncan, SNK, Tukey, Scheffe)

Factorial experiments

- Sub-plots
- Repeated measures

Correlation analysis

- Correlation coefficient
- Test of significance for *r*
- Comparison of two correlation coefficients

Regression analysis

- Linear regression

	• Test of significance for β • Prediction of y values **Covariance analysis** **Non-parametric analyses** • Mann-Whitney *U* test • Kruskal-Wallis test **Multivariate analysis** • Cluster analysis • Principal component analysis • Discriminant analysis
Teaching Methodology	Lecture Active live engagement in learning activities, discussion and problem solving Autonomous learning
Bibliography	(1) Teaching notes by the instructor (2) Principles of Plant Genetics and Breeding, 2012, 2nd Edition, George Acquaah ISBN 978-0-470-66475-9, John Wiley & Sons, Ltd (3) Γενετική Βελτίωση Φυτών: Βασικές Αρχές, 2005, Νίκος Φανουράκης ISBN 9604115405, εκδόσεις ΙΩΝ (in Greek) (4) Experimental design and data analysis for biologists. 2006. G.P. Quinn and M.J. Keough ISBN 0-521-00976-6 Cambridge University Press (5) Biostatistics with R. 2012. Babak Shahbaba. ISBN 978-1-4614-1301-1. Springer (6) Applied Statistical Methods in Agriculture, Health and Life Sciences. 2014. Bayo Lawal. ISBN 978-3-319-05554-1. Springer
Assessment	Exercises 25% Exam on exercises 25% Final Exam 50% Part of the testing essays include multiple choice, fill-in, matching, definitions, short answer and full essay questions. The test contains knowledge questions and questions that the student needs to combine knowledge gained from the course.
Language	Greek (English Terminology Provided for All Common Terms of Agricultural Experimentation)

Course Title	**Physiology & Biochemistry of Agricultural Products**				
Course Code	ABF507				
Course Type	Theory				
Level	Postgraduate				
Year / Semester	Fall Semester/1st Semester/1st year				
Teacher's Name	Dr. George Manganaris (40%) Dr. George Botsaris (40%) Dr. Nikolaos Tzortzakis (20%)				
ECTS	8	Lectures / week	3 h (2 x 1,5)	Laboratories / week	-
Course Purpose and Objectives	The course is separated in two Directions ('Plant Science' and 'Food Science') and aims to study the main aspects of physiology & biochemistry of agricultural products. Physiological and biochemical characteristics of products of plant origin (60%): This course is on the interface of the primary agricultural production and food technology. It aims to analyze the post-harvest vegetable products' physiology and technology as well as the widespread term and / or innovations technologies viruses which maintain the quality of a range of fruit and vegetable products. Physiological and biochemical characteristics of products of animal origin (40%): The second part of the course aims to analyse the physiological and biochemical characteristics of animal-origin products. The main categories will be presented, with emphasis on meat, meat and dairy products. The purpose of the course is to analyse the factors affecting the quality of those products during production and after packaging. Case studies will give students the opportunity to encounter troubleshooting of the source during processing and packaging food of animal origin.				
Learning Outcomes	Upon completion of the course, the student is expected to: – synthesize and provide solutions/recommendations of postharvest technologies and commercially applicable storage solutions of horticultural commodities, based on the commodity capital and function cost of the food - recommend state-of-the-art postharvest technologies for storage at room facilities or during transportation to distant markets - evaluate products of animal origin and ensuring safety by using commercial applications - recommend processing and maintenance technologies for food of animal origin In addition, the student is expected to acquire the following general abilities: 1. Practice critical judgment 2. Data and information searching, analysis and synthesis				

	3. Use of up-to-date bibliographic references and ability to solve practical issues 4. Development of written and oral communication skills		
Prerequisites	-	Required	-
Course Content	- Quality of horticultural products and factors affecting their postharvest life - Properties of horticultural products (structure, composition, nutritional value, phytochemical profile) and maturity indices - Integrated protocols to improve postharvest life of horticultural commodities - Advanced Cooling systems – The case of Dynamic Controlled Atmosphere - Physiological disorders - Fresh-cut horticultural products - Edible coating - Decay and advanced preservation means (natural products, essential oil, ozone, salts etc.) - Quality and storage of flowers - Animal-origin Food Science and Technology. - Animal-origin Food Categories - Meat and meat products (evaluate pH changes and post-mortem muscle contraction, enzymatic conversion of muscle proteins, the effect of pH and conditioning on meat tenderness, reduction of ATP levels and biological membrane proteolysis. The effects of genotype and handling on meat quality will also be presented. - Conversion of muscle tissue to meat - Meat quality, preservation and packaging - Meat products - Dairy Technology, Milk and dairy products (Yogurts and Yogurt drinks, Cheeses) Quality control and safety - Good Hygiene Practice in Food Industries / Foodstuffs - Food Safety Assurance Systems - Case Studies		
Teaching Methodology	- Lectures in class (face to face) - Team and autonomous work - Case studies and problem solving - Upload of teaching modules in Moodle, including key bibliographic references for additional reading		
Bibliography	Books: 1. De Freitas Tornetto S, ParEek S. 2019. Postharvest physiological disorders in fruits and vegetables. CRC Press. 9781138035508, pp. 823. 2. Florkowski WJ, Prussia SE, Shewfelt RL, Brueckner B. 2009. Postharvest Handling - A Systems Approach. Academic Press, ISBN:9780123741127, pp. 640. 3. Nath P, Bouzayen M, Mattoo A, Pech JC. 2014. Fruit ripening: Physiology, Signalling and Genomics. ISBN:9781845939625, pp. 336.		

	4. Siddiq M, Ahmed J, Lobo MG, Ozadali F. 2012. Tropical and Subtropical Fruits: Postharvest Physiology, Processing and Packaging. ISBN: 9780813811420, pp. 648. 5. Thompson AK. 2010. Controlled atmosphere storage of fruits and vegetables. CABI, ISBN:9781845936464, pp. 272. 6. Τεχνολογία Κρέατος, Ιωάννης Γ. Μπλούκας, Εκδόσεις Σταμούλη Α.Ε., 2007, ISBN 9789603517146 7. Το κρέας και τα προϊόντα του, Σπύρος Α. Γεωργάκης, Σύγχρονη Παιδεία, Χ. & Β. Κορδαλή Α.Ε., 2002, ISBN 9603570664 8. Food Science and Technology, Geoffrey Campell-Platt, Wiley-Blackwell, 2009, ISBN 9780632064212 9. Lawrie's Meat Science, 8th Edition, Editors: Fidel Toldra, Hardcover ISBN: 9780081006948, eBook ISBN: 9780081006979, Imprint: Woodhead Publishing 2017 10. Food Processing Technology, 4th Edition, Principles and Practice, Authors: P J Fellows, eBook ISBN: 9780081005231, Hardcover ISBN: 9780081019078, Imprint: Woodhead Publishing 2016 Review articles: 1. Watkins CB: New technologies for storage of horticultural products – There is more to adoption than availability! In: Acta Horticulturae. vol. 1194; 2018: 1233-1244. 2. Tucker G, Yin XR, Zhang AD, Wang MM, Zhu QG, Liu XF, Xie XL, Chen KS, Grierson D: Ethylene and fruit softening. Food Qual Saf 2017, 1(4):253-267. 3. Gascuel Q, Diretto G, Monforte AJ, Fortes AM, Granell A: Use of Natural Diversity and Biotechnology to Increase the Quality and Nutritional Content of Tomato and Grape. Frontiers in Plant Science 2017, 8(652). 4. Watkins CB: Pre- and postharvest inhibition of ethylene production and action by 1-MCP and the quality of apples and other horticultural products. In: Acta Horticulturae. vol. 1120; 2016: 1-10. 5. Valero D, Guillén F, Valverde JM, Castillo S, Serrano M: Recent developments of 1-methylcyclopropene (1-MCP) treatments on fruit quality attributes. In: Eco-Friendly Technology for Postharvest Produce Quality. 2016: 185-201. 6. Glowacz M, Rees D: The practicality of using ozone with fruit and vegetables. J Sci Food Agr 2016:4637-4643. 7. Bessemans N, Verboven P, Verlinden BE, Nicolaï BM: A novel type of dynamic controlled atmosphere storage based on the respiratory quotient (RQ-DCA). Postharvest Biol Tec 2016, 115:91-102. 8. Pedreschi R, Lurie S: Advances and current challenges in understanding postharvest abiotic stresses in perishables. Postharvest Biol Tec 2015, 107:77-89. 9. Mahajan PV, Caleb OJ, Singh Z, Watkins CB, Geyer M: Postharvest treatments of fresh produce. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 2014, 372(2017). 10. Lado J, Rodrigo MJ, Zacarías L: Maturity indicators and citrus fruit quality. Stewart Postharvest Review 2014, 10(2).
Assessment	Final exams (60%) and mid-term exams (40%)
Language	Greek (terminology for specific terms are provided in English)

Course Title	**Advanced Techniques in Molecular Biology & Bioinformatics**				
Course Code	ABF504				
Course Type	Theory and Laboratories				
Level	Postgraduate				
Year / Semester	Spring Semester/2nd Semester/1st year				
Teacher's Name	Dr. Vasileios Fotopoulos, Dr. Andreas Katsiotis, Dr. Nikos Nikoloudakis, Dr. Iakovos Pantelides (Laboratory practicals)				
ECTS	8	Lectures / week	2 x 1.5h	Laboratories / week	1 x 3h
Course Purpose and Objectives	This course aims to develop skills in advanced molecular biology and bioinformatics techniques, focusing on technical details as well as the potential for their use in modern molecular biology studies and biotechnological applications. An important part of the course is the hands-on learning of these techniques, in order students to be able to apply them in an appropriate work/laboratory environment. The course also aims at the development of problem solving skills, focusing on the examination of examples/case studies related to the concepts and principles taught.				
Learning Outcomes	Upon successful completion of the course, students will be able to use the molecular biology techniques which are mentioned in the course content below. During laboratory practicals, students will learn how to conduct scientific experiments by using molecular techniques and will be able to collect data of physiological significance and analyze research data. During the assignment, student acquire skills regarding the critical analysis and interpretation of research articles published in high impact factor journals, as well as how to present them in front of an audience. Furthermore, students are expected to develop creative thinking, independent work and collaboration in work groups.				
Prerequisites	None		Required	None	
Course Content	Lectures • DNA organization and packaging in eukaryotic organisms • Molecular markers (RFLP, RAPD, AFLP, SSR) • cDNA and genomic library construction • Real-time polymerase chain reaction (qRT-PCR) • Microarrays (Affymetrix, Agilent) • Next generation sequencing (NGS) • Gene silencing (RNAi – VIGS) • Proteomics • Gene cloning				

	• SAGE – SuperSAGE • Suppressive-subtractive hybridization (SSH) • Epigenetic analyses • Bioinformatics <u>Laboratory practicals</u> - Health and Safety in Molecular biology Labs - DNA isolation from bacteria and fungi - Amplification of the bacterial 16S rRNA and the fungal ITS rRNA region - DNA gel electrophoresis - Purification of small DNA fragments from an agarose gel using silica columns - Sequencing Reactions for Sanger Sequencing - Sequencing product cleaning and capillary electrophoresis - Compare and identify obtained sequences in NCBI databases using BLAST algorithm - RNA isolation from plant tissue - cDNA synthesis and Real-time PCR - Analysis of Real-time PCR results to calculate gene expression levels - Bioinformatics (multiple sequence alignment and dendrogram construction) - Presentation of results, comparison of data and discussion
Teaching Methodology	- Lectures - Laboratory practicals - Active participation in learning activities, discussion and question/problem solving - Independent learning based on suggested bibliography and websites
Bibliography	1. Βιοτεχνολογία Φυτών. Π. Χατζόπουλος. Εκδόσεις Έμβρυο. ISBN 960-8002-08-7 2. Genes VIII – Ελληνική Έκδοση (2 τόμοι). B. Lewin. Ακαδημαϊκές Εκδόσεις. ISBN 960-88412-0-8 3. Gene cloning and DNA analysis. T.A. Brown. 5η έκδοση. Εκδόσεις WileyBlackwell. ISBN 978-1405111218 4. Biochemistry & Molecular Biology of Plants, 2002. Russell L. Jones et al. 2η έκδοση. Εκδόσεις Wiley ISBN 978-0943088372 5. Principles of Gene Manipulation and Genomics. R.M. Twyman and S.B. Primrose 7η έκδοση. Εκδόσεις Wiley ISBN 978-1405135443 6. Doudna & Charpentier (2014). The new frontier of genome engineering with CRISPR-Cas9. Science 346, Issue 6213, Article number 1258096 7. Grabherr et al (2011). Full-length transcriptome assembly from RNA-Seq data without a reference genome. Nature Biotechnology 29, Issue 7, 644-652 8. Wang et al (2009). RNA-Seq: a revolutionary tool for transcriptomics. Nature Reviews Genetics 10, 57–63 9. Aebersold & Mann (2003). Mass spectrometry-based proteomics. Nature 422, 198–207 10. Jones (2012). Functions of DNA methylation: islands, start sites, gene bodies and beyond. Nature Reviews Genetics 13, 484–492 11. Huntzinger & Izaurralde (2011). Gene silencing by microRNAs: contributions of translational repression and mRNA decay. Nature Reviews Genetics 12, 99–110
Assessment	- Final exams 50%

	- Exam questions are formed based on material taught in lectures and practical classes, and include essay questions, closed type questions (multiple choice, filling gaps etc) as well as combinatorial questions. - Final laboratory practicals exam 30% - Assignment/presentation 20%
Language	Greek (terminology for specific terms are provided in English)

Course Title	**Biotechnology**				
Course Code	ABF505				
Course Type	Theory and Laboratories				
Level	Postgraduate				
Year / Semester	Spring Semester/2nd Semester/1st year				
Teacher's Name	Dr. Vasileios Fotopoulos, Dr. Despoina Miltiadou, Dr. Dimitris Tsaltas (Lectures), Dr. Iakovos Pantelides (Laboratory practicals)				
ECTS	8	Lectures / week	1 x 3h	Laboratories / week	1 x 3h
Course Purpose and Objectives	Main course objective is the develop of concepts and practices in biotechnology, focusing on the potential for their use in modern approaches such as the introduction of novel/desired traits in microbial, plant and animal organisms and the use of GMOs as bioreactors for the production of high added value compounds. In addition, an important part of the course is risk/problem analysis linked with biotechnological applications to humans and the environment, as well as the promotion of public awareness regarding the potential contribution of GMOs and their use in everyday life. The course also aims at the development of problem solving skills, focusing on the examination of examples/case studies related to the concepts and principles taught.				
Learning Outcomes	Upon successful completion of the course, students are expected to have comprehensive knowledge of concepts and practices of biotechnology as described in the content of the course below. Students are expected to be able • to study current scientific literature in agricultural biotechnology and effectively communicate with biotech and other interdisciplinary professionals. • to conduct scientific experiments using technical skills in biotechnology and collect data of physiological significance and analyze research data • to develop critical and creative thinking and problem solving skills and be able to prepare a review article through meta-analysis of available literature • work independently and in groups				

Prerequisites	None	Required	None
Course Content	Lectures 1. Introduction to biotechnology and microbial biotechnology 2. Bioreactors and fermentation 3. Metagenomics 4. Plant tissue/cell culture 5. Transformation vectors 6. Physiological methods of DNA transformation into plant cells 7. DNA transformation with Agrobacterium 8. Genetically modified plants (main examples, specialized applications, e.g. edible vaccines, biofuel, environmental and health concerns) 9. Generation, analysis and use of transgenic cells 10. Genetic identification of single-gene traits in animal production 11. Paternity testing, identification of genetic relationships, breed validation 12. Sex determination and selection 13. Transgenic animals and veterinary/animal production applications 14. Organism cloning principles 15. Genetically modified animal feed Practical laboratory classes - Health and Safety in Biotechnology Labs - Preparation of *E. coli* competent cells using $CaCl_2$ - Design of PCR primers - DNA amplification with primers including restriction sites - Agarose gel electrophoresis to confirm DNA amplification - Plasmid DNA and PCR product digestion - DNA fragment ligation - Bacterial cell transformation - Plasmid DNA isolation - Virus induced gene silencing (VIGS) - *Agrobacterium tumefaciens* mediated transformation (ATMT) of fungal cells - Epi-fluorescence microscopy to observe GFP and DsRed fluorescence proteins in transformed fungal cells - Presentation of results, comparison of data and discussion		
Teaching Methodology	- Lectures - Laboratory practicals - Assignment - Active participation in learning activities, discussion and question/problem solving - Independent learning based on suggested bibliography and websites		
Bibliography	1. Βιοτεχνολογία Φυτών. Π. Χατζόπουλος. Εκδόσεις Έμβρυο. ISBN 960-8002-08-7 2. Genes VIII – Ελληνική Έκδοση (2 τόμοι). B. Lewin. Ακαδημαϊκές Εκδόσεις. ISBN 960-88412-0-8 3. Gene cloning and DNA analysis. T.A. Brown. 5η έκδοση. Εκδόσεις WileyBlackwell. ISBN 978-1405111218		

	4. Biochemistry & Molecular Biology of Plants, 2002. Russell L. Jones et al. 2η έκδοση. Εκδόσεις Wiley ISBN 978-0943088372 5. Principles of Gene Manipulation and Genomics. R.M. Twyman and S.B. Primrose 7η έκδοση. Εκδόσεις Wiley ISBN 978-1405135443 6. Molecular Biotechnology. Principles and Applications of Recombinant DNA. B. Glick, C. Patten, J. Pasternack. 4th Edition, ASM Press. http://site.ebrary.com/lib/cut/search.action?p00=eball&search=Search+ebrary 7. Microbial Biotechnology, Fundamentals of Applied Microbiology, Second Edition, 2007, Alexander N. Glazer, Hiroshi Nikaido. Cambridge University Press, ISBN-13 978-0-521-84210-5 8. An Introduction to Biotechnology, 1st Edition (2014). W T Godbey. Elsevier, ISBN 9781907568282 9. Sticklen (2008). Plant genetic engineering for biofuel production: Towards affordable cellulosic ethanol. Nature Reviews Genetics 9, Issue 6, 433-443. 10. Ort et al (2015). Redesigning photosynthesis to sustainably meet global food and bioenergy demand. Proceedings of the National Academy of Sciences of the United States of America 112, Issue 28, 8529-8536. 11. Rybicki (2010). Plant-made vaccines for humans and animals. Plant Biotechnology Journal 8, Issue 5, 620-637. 12. Ahmad et al (2012). Role of transgenic plants in agriculture and biopharming. Biotechnology Advances 30, Issue 3, 524-540.
Assessment	- Final exams 50% - Exam questions are formed based on material taught in lectures and practical classes, and include essay questions, closed type questions (multiple choice, filling gaps etc) as well as combinatorial questions. - Final laboratory practicals exam 30% - Assignment/presentation 20%
Language	Greek (terminology for specific terms are provided in English)

Course Title	**Molecular and Applied Ecology**				
Course Code	ABF 506				
Course Type	Theory and Laboratory				
Level	Post-graduate				
Year / Semester	Spring Semester/2nd Semester/1st year				
Teacher's Name	Dr. Menelaos Stavrinides (70% theory and 100% Lab), Dr. Loukas Kanetis (20%), Dr. George Botsaris (10%)				
ECTS	7	Lectures / week	1 x 3 hr	Laboratories / week	1 x 2hr
Course Purpose and Objectives	Be able to develop critical analysis in the interactions between agriculture and the environment, and skills for analyzing and designing sustainable agricultural systems				
Learning Outcomes	Upon the successful completion of the course students are expected to be able to: • Discuss the use of genetically modified crops and analyze their impacts and be able to contrast the conventional agriculture with the sustainable/ biochemical production systems • Recognize and compare the impacts of pesticides to non-target organisms • Calculate the carbon footprint of agricultural products and analyze the impacts of climate change on agriculture and propose mitigation and adaptation measures • Apply molecular methods for species identification • Interpret the results of laboratory and field studies, and present their results in writing and orally				
Prerequisites	---	Required	---		
Course Content	The course begins with a brief discussion of the history of agriculture, with special focus on the environmental impacts of conventional agriculture. We continue with a lecture on ecotoxicology, using pesticides as a case study. During the third week of the course we discuss the advantages and disadvantages of genetically modified crops, and review EU and international policies on the topic. We will then discuss shift our focus to the Common Agricultural Policy of the EU, to analyze the impact of agri-environmental schemes, and especially measures targeting biodiversity conservation. Food labelling schemes, including the carbon footprint and the more recent environmental footprint are analyzed as tools to increase the marketability of products. We apply the "CoolFarm Tool" to calculate				

	components of the environmental footprint of agricultural products in group projects. For the next part of the course we concentrate on the impacts of climate change on agriculture. We evaluate the expected impacts of climate change on crop production and review adaptation measures for Cyprus. We use the CLIMEX software to model the effects of climate change on agricultural pests. In addition, we analyze mitigation options for the reduction of greenhouse gas emissions from agriculture. In the last part of the course we focus on species interactions. We discuss the epidemiology of food pathogens and zoonoses. We continue with a presentation of the impact of invasive species on the environment, an analysis of pathogen resistance to pesticides, and the use of molecular methods for the study of both invasive species and plant pathogens. Throughout the course we review case studies for each of the presented topics and use specialized software to complete individual and group projects.
Teaching Methodology	• Lectures • Group discussion • Videos and animations • Case studies • Assignments • Presentation and discussion of individual/group projects
Bibliography	**1.** Hoegh-Guldberg O. et al. 2018. Impacts of 1.5 ºC Global Warming on Natural and Human Systems. In: Global Warming of 1.5 °C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty – available at https://www.ipcc.ch/sr15/ **2.** Ecology: The experimental analysis of distribution and abundance. 6th edition. Krebs. 2009. Benjamin Cummings. ISBN 978-032-150-743-3 **3.** Additional references (e.g. published studies, EU policies and legislation) are provided during lectures to cover the relevant topics.
Assessment	50 points for laboratory assignments and projects (4 projects at 10 points each and two smaller assignments at 5 points each) 50 points for final exam Total: 100 points
Language	Greek

Course Title	**Advanced Techniques of Analysis in Biotechnology**				
Course Code	ABF 508				
Course Type	Theory and Experimental lab				
Level	Postgraduate				
Year / Semester	Spring Semester/2nd Semester/1st year				
Teacher' s Name	Dr. Chryssoula Drouza (Theory and Experimental)				
ECTS	7	Lectures / week	2 x1.5 hrs	Laboratories / week	2h X 1 group
Course Purpose and Objectives	The aim of the course is the development of students' skills for the application of analytical techniques for the qualitative/quantitative determination of metabolites of food during biotechnological processes The Experience gain for the determination of metabolites and the application of kinetics for the determination of denaturation / processing of food.				
Learning Outcomes	Students will be able to 1) interpret the results derived from the measurements, evaluate the method / technique used, publish the results correctly and 2) interpret the measurements by spectroscopic techniques such as Infrared, Visible-UV, Fluorescence, Nuclear Magnetic Resonance, Electron Paramagnetic Resonance on the base of the interaction of matter with radiation specifically for each technique, as well and the measurements by mass spectrometry/isotopic techniques on the base of the creation of "fingerprint" of mass fragments/isotopes, and the measurements by chromatographic techniques on the base of the interactions of substances with a two phases system. Students are expected to determine components during biotechnological processes, and kinetics of the process one base of the monitoring the process by a specific technique. By the end of the lesson students will are expected to be able to combine the application of the advanced techniques in biotechnological processes with the authenticity and the quality of final products. In the laboratory part, students will undertake in groups of two atoms a small experimental project for the application of a specific technique on a biotechnological process under the supervision of the professor responsible for this course, towards the investigation of subjects of the field of food chemistry similar with those met in advance research in academia or industry.				

Prerequisites	none	Required	none
Course Content	Lectures 1. Introduction to the analysis a. Evaluation of measurements - data b. Measurement error, error sources, confidence limits, sensitivity and limit of Detection, Rejection of values c. Linear Regression d. Publication of results 2. Introduction to Chromatographic Techniques a. Introduction to chromatography b. Gas chromatography (GC-MS, GC-FID) a. Liquid chromatography: Thin layer and single column Chromatography, Low Pressure Chromatography (Flash Chromatography High Performance Liquid Chromatography, Ion exchange chromatography, Size exclusion chromatography (gel chromatography), Affinity chromatography 3. Spectroscopic techniques a. Infrared spectroscopy b. Ultraviolet-Visible (UV-Vis) Spectroscopy c. Fluorescence Spectroscopy d. Nuclear Magnetic Resonance Spectroscopy, relaxation time,1D NMR: ^{1}H, ^{13}C, ^{31}P NMR, ^{19}F NMR φασματοσκοπία, 2D NMR: COSY, NOESY, HMBC, HSQC, TOCSY, Spectra: for structural and composition e. Electron Paramagnetic Resonance Spectroscopy, electron paramagnetism in magnetic field, spectrum of powder spectrum-line shape, anisotropy, hyperfine coupling, anisotropic coupling, Radicals Basic Chemistry, Identification of the Organic Radicals and Metals, quantitative EPR, kinetics. 4. Isotopic techniques 2H-Site-specific Natural Isotope Fractionation (Snif-NMR), Isotopic Ratio Mass spectrometry (IRMS). EXPERIMENTAL PART In the laboratory part, students will undertake in groups of two atoms a small experimental project for the application of a specific technique on a		

	biotechnological process under the supervision of the professor responsible for this course, towards the investigation of subjects of the field of food chemistry similar with those met in advance research in academia or industry.
Teaching Methodology	i. Lectures ii. Organized presentation of the lesson that includes images, animations, diagrams, equations with the power point software iii. Resolving auxiliary exercises, written by the teacher and given free to students, for study and practice as a tool for supervised learning iv. Active participation of students in workshops organized to solve exercises and for assimilation of the concepts of the course v. Educational excursion to the General Laboratory of the State for investigating the analytical methods applied by the analytical laboratory vi. Laboratory experimental project in an equipped chemical laboratory, where students gain experience with laboratory chemical techniques working in groups of two people. The performance of all experimental exercises is mandatory for all students. vii. Bibliographic search and oral presentation for the results of the experimental project in the class. viii. Recording of the experimental procedure and results in a hard-core experimental notebook as a basis for training in chemical experimentation. ix. Solving students' questions, individually or in small groups, in non-class hours.
Bibliography	(1) Διδακτικές σημειώσεις μαθήματος που έχουν ετοιμαστεί από τη διδάσκουσα βάση των αναγκών του μαθήματος του προγράμματος σπουδών, και δίνονται δωρεάν στους φοιτητές (2) “Spectroscopic Methods in Food Analysis”, Adriana S. Franca and Leo M.L. Nollet, 1st Edition, USA, CRC Press, Taylor & Francis Group, 2018, ISBN-13: 978-1-4987-5461-3 (main textbook). (3) “Food Analysis”, Nilsen, S. S., 3rd Edition, USA, Springer, 2003, ISBN 0-306-47495-6. (4) Ομαδοποιημένες ασκήσεις με τις απαντήσεις, για την εμπέδωση των εννοιών του μαθήματος, για μελέτη κατ’ οίκον και επιλεκτική επίλυση στα workshops, Χρυσούλα Δρούζα, Λεμεσός 2016
Assessment	Rating and Contribution Rates i. Interim examination: accounts for 25% of the total ii. Final examination: accounts for 50% of the total Testing essays include multiple choice questions, limited and full-time questions, judgment questions and combinatorial questions, and problem solving that addresses the learning outcomes as outlined above. iii. Laboratory grade accounts for 25% of the total.

	The laboratory grade is a result of an organized assessment system based on (i) the student's preparation, (ii) the experimental skill and performance of the experiments, and (iii) the final written examination
Language	Greek

Course Title	**Agro-Industrial Fermentations**				
Course Code	ABF 511				
Course Type	Theory				
Level	Postgraduate (MSc)				
Year / Semester	Spring Semester/2nd Semester/1st year				
Teacher's Name	Dr Photis Papademas/Dr Dimitris Tsaltas				
ECTS	7	Lectures / week	1 x 3hr	Laboratories / week	1 X 2hrs tutoring
Course Purpose and Objectives	The course aims to develop skills in order students be able to apply the principles of (traditional) food fermentation both in plant and animal products. The course also aims to familiarize students in fermentation technology (aerobic/anaerobic) in order to be able to work at industries (food or others) in which fermentation is applied.				
Learning Outcomes	Students are expected to be able to: • distinguish, according to specific criteria, which microorganisms are suitable for specific fermentations (i.e. tolerance on high salt concentrations, temperature, pH/acidity. Additionally, students must be in apposition to analyse the advantages on using starter cultures for agro-industrial fermentations. • describe the role enzymes (exogenous/endogenous) have in fermentations and the effect they have in product's quality and safety/preservation. Additionally, students should be able to develop the principles of modern applications of biotechnology related to food fermentations and determine the possibility of adding lactic acid bacteria, yeasts and fungi to foods for the production of added-value foods i.e. functional foods/ nutraceticals and to food constituents that are a result of fermentation and could be health-promoting i.e. bioactive peptides by the bacterial breakdown of food proteins Finally, students are expected to know how to manage animal and plant waste for converting them to "added-value" products such as bio-methane, compost. Other important fermentations such as alcoholic (i.e. beer/wine), and others i.e. pickling must also be well-comprehended by students.				
Prerequisites	None	Required	None		

Course Content	• Introduction to Agro industrial Fermentations
	  ○ Tradition meets modern day applications
	• Bacterial metabolism (lactic acid bacteria and yeasts)
	  ○ Environmental issues and growth conditions
	  ○ Metabolic pathways
	  ○ Control or inhibition of bacterial growth
	• Starter Cultures
	  ○ Selection of bacterial starters – technology characteristics
	  ○ Microflora to starter cultures – manufacturing technology
	  ○ Natural Starters
	• Animal-based Fermentations
	  ○ Dairy Products
	  ○ Meat Products
	• Enzymes
	  ○ Animal rennets
	  ○ Microbial rennets
	  ○ Plant-based enzymes - case study coagulating enzymes from Cynara cardunculus (i.e. Cheeses from Portugal)
	  ○ Applications in the food industry (i.e. lipases or proteases for acceleration of cheese maturation)
	• Bioactive Peptides
	  ○ Lactic acid Bacteria Οξυγαλακτικά βακτήρια ---πρωτεολυτικές ιδιότητες
	  ○ Type of substrates (i.e. caseins, whey proteins)
	  ○ Foods as sources of bioactive peptides (i.e. mature cheese)
	  ○ Isolation/fractionation/characterization
	  ○ Fermentation protocols for the production of specific bioactive peptides
	  ○ Effect on Health (i.e. industry-applications of bacteriocins)
	• Plant-Based Fermentations (i.e. algae, olives)
	• Mycoproteins (i.e. Quorn) and Mushrooms
	• Biotechnology in wine and beer fermentations

	• Composting, biomethane production and other added-value products from agricultural/food industry • Project Presentations
Teaching Methodology	Lectures Discussion, Classroom exercises/group work Project work Autonomous learning
Bibliography	(1) Hutkins, R.W (2006) Microbiology and Technology of Fermented Foods, USA: IFT Press (2) Bamforth, C.W (2005) Food, Fermentation and Micro-organisms, UK: Blackwell Publishing ltd (3) Microorganisms and Fermentation of Traditional Foods,2014 Ramesh C. Ray, Montet Didier CRC Press ISBN 9781482223088 https://www.crcpress.com/Microorganisms-and-Fermentation-of-Traditional-Foods/Ray-Didier/p/book/9781482223088 (4) Advances in Food Biotechnology, Ravishankar Rai V, 2015, Print ISBN:9781118864555 |Online ISBN:9781118864463 |DOI:10.1002/9781118864463, 2016 by John Wiley & Sons Ltd https://onlinelibrary.wiley.com/doi/book/10.1002/9781118864463
Assessment	• Final Examination 50% Final exams mainly include essay type questions. • Project 40% The project work (case study learning) involves the literature review and the proposal of an innovative or considerably improved product or process as a result of fermentation/biotechnology technology. Students are required to visit a relative industry and use it as their case study. • Presentation of a published research article 10%
Language	Greek – Some seminars given by invited speakers are in English (English Terminology in Fermentations/Biotechnology is provided)

ANNEX 2 – COURSE DESCRIPTION	**Master Thesis MSc**				
Course Code	ABF 580				
Course Type	Research Thesis				
Level	Postgraduate				
Year / Semester	1st and 2nd year / Summer Session (15ECTS) and 3rd Semester (30ECTS)				
Teacher's Name	Member from academic staff				
ECTS	45	Lectures / week	--	Laboratories / week	---
Course Purpose and Objectives	The master's thesis aims to develop the ability to conduct independent research and draw conclusions that have a research / scientific interest in a particular field of Agricultural Biotechnology and its applications in Agricultural Science and Food Science and Technology.				
Learning Outcomes	Upon successful completion of the master's thesis, students are expected to: Develop co-operative skills for being able to communicate and collaborate effectively with the Master Thesis Advisor and with other members of the academic staff for submitting and completing their Master Thesis successfully. Formulate and understand the research hypothesis of their master's Thesis in collaboration with their Master Thesis Advisor Identify, collect, organize and present research data from international literature mainly from reputable scientific journals in order to write a comprehensive bibliographic review that demonstrates all the reliable, recent and critically selected information related to the topic selected. Use research techniques and methodology and organize their work effectively to implement the experimental part of their master's Thesis Record, calculate / analyze statistically where required and present the results of their research Discuss the results of research and explain their significance, link and compare their research results with those of previous research, correlate and generalize their results, based on the size of their sample of research and the population concerned by recognizing the limitations of their research				

	Be able to write the research methodology, results and discuss results by using appropriate language and terminology		
Prerequisites		Required	
Course Content	The Master thesis is mainly experimental or in some cases meta- data analysis or review study. In most of the cases that are experimental studies, students are involved in farm, animal or food industry experiments and / or in the laboratory work in the Department. For all types of research, the collected data are analyzed using the appropriate statistical methodology, and the student writes his / her thesis. The form of the thesis generally follows the standard required for writing a scientific article including bibliographic review, methodology, results and discussion. In cases of writing a review study, it must be novel either by using statistical analysis of data from other studies (meta- analysis) or by review of one or more scientific areas that have not been recently reviewed and require survey.		
Teaching Methodology	Students work under the supervision of a faculty academic staff (Research Advisor) for the preparation of a study related to the subject of their specialization. Students, under the guidance of their research advisor, design the research methodology and collect the necessary data and bibliography needed for their study, perform the experiments, analyze, present and write their thesis.		
Bibliography	**1.** Graduate Thesis and Thesis Writing Guide - available from the TEPAK library (http://libguides.cut.ac.cy/etds) **2.** Articles of scientific journals **3.** Books related to the subject, especially on Methodology issues		
Assessment	The thesis is evaluated by his supervisor (60%) and two co-supervisors (members of the academic staff of the department or other departments of the University or members from other research / educational institutions that are PhD holders) with 20% each		
Language	Greek (Good knowledge of English is required for searching, studying and understanding the literature)		

Indicative list of seminars

Medicinal and Aromatic Plants in Cyprus

https://www.cut.ac.cy/events/event/?contentId=127440

Molecular Biology and Plant Biotechnology

https://www.cut.ac.cy/digitalAssets/115/115170_100CUT_1225_INV_gevet_.pdf

Sustainable vine cultivation in Cyprus and Europe

https://www.cut.ac.cy/events/event/?contentId=106740

Developments in Genomics

https://www.facebook.com/events/1982563055361571

Highly-valued agricultural areas: Science, politics and agrotourism

http://agrolife.eu/meeting-with-topic-agriculture-high-nature-valueareas-science-policy-and-agro-tourism/

Empower Cypriot SMEs in Food Production

Contemporary Citrus Production Trends and Challenges: A Holistic Approach

http://web.cut.ac.cy/fruitsciencesgroup/wpcontent/uploads/sites/

Primary sector development tools: Production of high value added products and European quality and certification systems

http://web.cut.ac.cy/fruitsciencesgroup/wpcontent/uploads/sites/16/2013/09/hAROUTOUNIAN.pdf.

Innovation and sustainability in traditional vine and carob cultivation

http://agrolife.eu/seminar-for-innovative-practices-for-carobgroves/