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| Course Title                  | Postharvest physiology and technology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |     |                     |                      |
| Course Code                   | ABF415                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |     |                     |                      |
| Course Type                   | Theory and Labs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |     |                     |                      |
| Level                         | Undergraduate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |     |                     |                      |
| Year / Semester               | Spring Semester/8h Semester/4 <sup>th</sup> year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |     |                     |                      |
| Teacher's Name                | Dr. George Manganaris (Lectures and Laboratories), Assistant Staff (Laboratories)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |     |                     |                      |
| ECTS                          | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Lectures / week | 2 h | Laboratories / week | 4 h (2 groups x 2 h) |
| Course Purpose and Objectives | <p>The course purpose is to render the students of two Directions ('Plant Science' and 'Food Science') familiar with the main aspects of postharvest physiology and technology of horticultural commodities. In particular, learning outcomes of this course are the students to understand and acquire knowledge regarding: (1) quality aspects of horticultural products, factors affecting postharvest life of horticultural products, (3) maturity indices, (4) ethylene and its inhibitors/antagonists, (5) preharvest factors affecting postharvest life of horticultural products, (6) preparation of horticultural products for the market, (7) precooling and Cooling systems, (8) advanced storage protocols (Modified/Controlled Atmosphere storage/Dynamic Controlled Atmosphere), (9), modified atmosphere packaging, (10) transportation of horticultural products, (11) physiological disorders due to abiotic stress conditions and (12) postharvest losses due to biotic factors.</p>                                                                                                                                                                                                                                                                                                                                       |                 |     |                     |                      |
| Learning Outcomes             | <p>Upon completion of the course, the student is expected to be familiar with the main concepts of postharvest physiology and technology, as indicated in the learning outcomes and course content. The aforementioned objectives will be fulfilled through acquired knowledge in the specific topics:</p> <ul style="list-style-type: none"> <li>- Knowledge on fruit physiology during developmental stages, at harvest and during postharvest ripening</li> <li>- Ability to synthesize and provide solutions and recommendations of postharvest technologies based on the commodity considered</li> <li>- Knowledge on commercially applicable storage solutions of horticultural commodities, its capital and function cost</li> <li>- Broadening knowledge in state-of-the-art postharvest technologies for storage at room facilities or during transportation to distant markets</li> </ul> <p>In addition, the student is expected to acquire the following general abilities:</p> <ol style="list-style-type: none"> <li>1. Practice critical judgment</li> <li>2. Data and information searching, analysis and synthesis</li> <li>3. Use of up-to-date bibliographic references and ability to solve practical issues dealing with aspects of postharvest technology</li> <li>4. Autonomous work</li> <li>5. Team work</li> </ol> |                 |     |                     |                      |

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|                      | 6. Development of written and oral communication skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |   |
| Prerequisites        | ABF 211: Plant Physiology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Required | - |
| Course Content       | <p><b>I. Theoretical part</b></p> <ul style="list-style-type: none"> <li>- Quality of horticultural products</li> <li>- Factors affecting postharvest life of horticultural products</li> <li>- Maturity indices</li> <li>- Ethylene and its inhibitors/antagonists (1-methylcyclopropene, AVG)</li> <li>- Preharvest factors affecting postharvest life of horticultural products</li> <li>- Preparation of horticultural products for the market</li> <li>- Heat treatments and examples of delayed storage</li> <li>- Precooling systems (hydrocooling, force-air cooling, vacuum cooling)</li> <li>- Cooling systems</li> <li>- Modified/Controlled Atmosphere storage/Dynamic Controlled Atmosphere</li> <li>- Advanced packaging solutions (Modified Atmosphere Packaging)</li> <li>- Transportation of horticultural products</li> <li>- Physiological disorders</li> <li>- Postharvest losses</li> </ul> <p><b>II. Lab exercises</b></p> <ul style="list-style-type: none"> <li>- Sources of information about postharvest physiology &amp; technology</li> <li>- Introductory note Maturity indices (physical, chemical, physiological characteristics)</li> <li>- Determination of tissue firmness with an array of destructive and non-destructive assays</li> <li>- Determination of soluble solids content, titratable acidity, ripening index</li> <li>- Chroma determination</li> <li>- Determination of dry matter content as maturity indices (kiwifruit, avocado)</li> <li>- Ethylene evolution and respiration rate</li> <li>- Sensory evaluation</li> <li>- Analysis of cell wall components</li> <li>- Experiment of storage potential of fresh product [team work (experiment and data presentation)]</li> </ul> <p>Course outline is additionally available on line at:<br/> <a href="http://web.cut.ac.cy/fruitsciencesgroup/courses/postharvest-physiology-technology/">web.cut.ac.cy/fruitsciencesgroup/courses/postharvest-physiology-technology/</a></p> |          |   |
| Teaching Methodology | <ul style="list-style-type: none"> <li>- Lectures in class (face to face)</li> <li>- Laboratory exercises (face to face)</li> <li>- Team and autonomous work</li> <li>- Case studies and problem solving</li> <li>- Upload of teaching modules in Moodle, including key bibliographic references for additional reading</li> <li>- Educational site visits in packing houses and distribution centers of fresh produce</li> <li>- Written exercises</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |   |

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|              | - Work at home and oral presentation of data derived from team experiment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Bibliography | <ol style="list-style-type: none"> <li>1. Βασιλακάκης Μ. 2006. Μετασυλλεκτική Φυσιολογία, Μεταχείριση Οπωροκηπευτικών και Τεχνολογία. Διαιτητική Αξία Οπωροκηπευτικών. ISBN:9608870682, pp. 586.</li> <li>2. Σφακιωτάκης Ε. 1995. Μετασυλλεκτική φυσιολογία και τεχνολογία νωπών οπωροκηπευτικών προϊόντων. Εκδόσεις ΤυροMan. Θεσσαλονίκη, pp. 381.</li> <li>3. De Freitas Tornetto S, ParEek S. 2019. Postharvest physiological disorders in fruits and vegetables. CRC Press. 9781138035508, pp. 823.</li> <li>4. Florkowski WJ, Prussia SE, Shewfelt RL, Brueckner B. 2009. Postharvest Handling - A Systems Approach. Academic Press, ISBN:9780123741127, pp. 640.</li> <li>5. Kader A. 2002. Postharvest Technology of Horticultural Crops. University of California, Agriculture and Natural Resources. Publication 3311. ISBN:1879906511, pp. 536.</li> <li>6. Nath P, Bouzayen M, Mattoo A, Pech JC. 2014. Fruit ripening: Physiology, Signalling and Genomics. ISBN:9781845939625, pp. 336.</li> <li>7. Siddiq M, Ahmed J, Lobo MG, Ozadali F. 2012. Tropical and Subtropical Fruits: Postharvest Physiology, Processing and Packaging. ISBN: 9780813811420, pp. 648.</li> <li>8. Thompson AK. 2010. Controlled atmosphere storage of fruits and vegetables. CABI, ISBN:9781845936464, pp. 272.</li> </ol> |
| Assessment   | Written exams in theory (60%) with short answers and multiple choice questions and laboratory (25%) with written exams and exercises. Student's total performance is assessed by the compensation of both grades on Theory and Laboratory modules. Additional evaluation (15%) is retrieved from homework assigned to students and presentation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Language     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |