



Programas de Internacionalización

Study Abroad 2021

Course title: From Lab to Soil to Truck: Mediterranean Greenhouse Horticulture at Almería

Teaching period: July 5 to July 30, 2020

Teaching hours: 80

Academic coordinator: Luisa Gallardo Pino

Knowledge area: Agriculture, Biotechnology and Business

1. INTRODUCTION

The University of Almería (UAL) is located in the heart of the highest concentration of medium technology plastic greenhouses in the world, and is the leading knowledge centre for Mediterranean greenhouse horticulture.

UAL's international course "From Lab to Soil to Truck: Mediterranean Greenhouse Horticulture at Almería" offers specialized training in the most relevant lines of greenhouse vegetable production: (1) irrigation management and fertigation, (2) biological crop protection, (3) greenhouse structures, (4) climate control, (5) biotechnology and plant breeding, and (6) agri-food marketing.

Research at the UAL is focused on developing sustainable greenhouse production systems with minimal environmental impact. Our research and teaching on greenhouse vegetable production has an international focus: There is substantial collaboration with researchers throughout Europe, China and Latin America (to mention some areas), and we receive many students from other countries and regions with similar greenhouse cropping systems (e.g. the Mediterranean Basin, Central and South America, or Iran).

Participating students will receive an excellent training and become knowledgeable of many aspects of protected crop production in the Mediterranean Basin. The course will have a strong practical component in that more than 50% of the activities will be conducted outside of the classroom, at greenhouse facilities of the UAL, commercial greenhouses, leading companies from various aspects of greenhouse crop production, and research stations.

The course is divided in four one-weekly modules, which will be taught by a joint team of professors, researchers and professionals specialized in the subject area of each module.



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2. OBJECTIVES

The main objective of the course is to provide practical training on relevant aspect of greenhouse crop production, such as (1) irrigation management and fertigation, (2) biological crop protection, (3) greenhouse structures, (4) climate control, (5) biotechnology and breeding and (6) agri-food marketing

3. CONTENT

Modules	Description
MODULE A <i>[Irrigation and Fertigation]</i>	<ul style="list-style-type: none"> • Techniques for optimal irrigation management in both, soil-grown and soilless greenhouse vegetable crops will be presented • Students will be shown, in a greenhouse, different sensors for irrigation and nutrient management, and will be shown their installation and use • Equipment for irrigation and fertigation will be explained and shown • Student will learn to prepare nutrient solutions for application by fertigation • Students will learn techniques for managing nutrients applied by fertigation in both open and closed recirculating systems • Student will visit commercial greenhouses with conventional and organic nutrient management
MODULE B <i>[Greenhouse structures and climate control systems]</i>	<ul style="list-style-type: none"> • Students will learn the main greenhouse structures and design, and the use of relevant practical calculations • Different climate control systems will be shown including those based on natural ventilation and those involving active climate control • Advanced techniques of modeling greenhouse internal climate by computational fluid dynamics will be demonstrated • A practical session with demonstrations will be conducted at the UAL farm as well as visits to commercial greenhouses.
MODULE C <i>[Biological control, breeding and biotechnology]</i>	<ul style="list-style-type: none"> • Students will learn the use of biological control for pests and diseases • Students will learn methods of grafting vegetables and of managing soil-borne diseases • There will be visits to a biological control company and to a commercial nursery • Genomic and biotechnological tools used in vegetable breeding will be demonstrated to students • Tools used for breeding to improve fruit quality, and abiotic and biotic stress tolerance in vegetable crops will be demonstrated



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	<ul style="list-style-type: none"> The practical training in vegetable breeding includes a visit to a seed company, several screening panels, seeing the mechanical inoculation of seedlings, and observing symptoms of susceptibility and resistance
MODULE D [Agri-Food Markets]	<ul style="list-style-type: none"> Local Markets, Global Competition and Cooperative Values: The case of Almerian Cooperatives exporting fruit and vegetables. Strategic decisions for the agri-food companies Marketing and Consumer Behaviour in the Horticultural Sector Innovation for entrepreneurs in horticulture. Agri-food marketing

4. METHODOLOGY

The course has been designed to have a very practical focus. Each module consists of a brief theoretical background followed by on-farm demonstrations, hands-on activities, practical calculations, and visits to various commercial greenhouses and companies. Professionals from private companies will participate in some of the session, which will provide an applied focus in the context of current and evolving technologies. All classes will be taught in English in UAL classrooms, at UAL experimental greenhouses, at research centers, and in companies.

5. PROFESSIONAL VISITS AND COMPLEMENTARY ACADEMIC ACTIVITIES

Information about visits to companies and research centers has been previously mentioned. Module A includes a one-day working session at the UAL experimental farm and a visit to several commercial greenhouses with different approaches to water and nutrient management (organic, conventional, in soil, soilless). Module B includes a training class at the university farm and a visit to several commercial greenhouses. Module C includes a visit to (i) a biological control company, (ii) a commercial nursery, and (iii) a seed company. Module D includes practical training sessions during visits to (a) the cooperatives facilities and (b) the alhóndigas (vegetable trade centers) linked to the fruit and vegetable sector. In Module A, a professional from a private company will participate.

6. ASSESSMENT

The evaluation procedure for passing the course is based on class attendance and active participation in the course activities.

7. LECTURERS

Luisa Gallardo Pino

Luisa (Marisa) Gallardo is a full professor at the Department of Agronomy, University of



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Almeria in Almeria, Spain. Her current research is focused on developing combined modelling and monitoring based management approaches for both nutrients and irrigation in vegetable crops. Her research group has developed the VegSyst-DSS decision support system that calculates nitrogen and water requirements for the seven major vegetable species grown in greenhouses in south-eastern Spain. She has experience in teaching courses in English in crop physiology and irrigation management at bachelor and master level.

Rodney Thompson

Rodney (Rod) Thompson is a full professor with the Department of Agronomy, University of Almeria in Almeria, Spain. His current research is focussed on developing combined modelling and monitoring based management approaches for both nutrients and irrigation in vegetable crops. One of the main aspects of this work is the use of various approaches (e.g. agronomic, optical sensors) to monitor the nutrient status and supply to crops. Other aspects include the use of soil sensors to assist with irrigation management and the use of decision support systems to provide plans for nutrient and irrigation management. Rod is native English speaker with considerable experience of presenting work related to nutrition and irrigation management to farmers, university students at various levels, and to international scientific audiences.

Santiago Bonachela Castaño

Santiago Bonachela is a full professor at the Department of Agronomy, University of Almeria in Almeria, Spain. His current research is focused on irrigation and climate management of Mediterranean greenhouse vegetable crops by combining modelling and experimental approaches. His research group has developed models for determining water requirements of Mediterranean greenhouse vegetable crops and soil evaporation of olive orchards. He has also worked on characterizing and improving passive heating and cooling systems In Mediterranean greenhouses. He has experience in teaching courses in English in climate and irrigation management of greenhouse vegetable crops at bachelor and master level.

Teresa Peña

Teresa (Tere) Peña is a very experienced field and laboratory technician working in the University of Almeria Crop Nitrogen and Irrigation Lab. She has 13 years of practical experience of management of vegetable crops in greenhouses. Because of the focus of our research lab, her crop management experience has been strongly focused on fertigation, irrigation and nutrient management. Tere has considerable experience with various crop nitrogen monitoring techniques, soil moisture sensors, rapid analysis systems, and monitoring of climatic conditions. She has given numerous practical talks and demonstration to local advisors, vegetable growers, Master's students, and visiting international scientists. Tere has a PhD in Agronomy, which provides a strong scientific foundation to her practical knowledge.



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Juan José Magán Cañadas

Juan José Magán is a researcher at the Research Centre of Cajamar Foundation in Almería, Spain. He is currently the responsible of the Greenhouse Technology department. His expertise is focused on fertigation management and climate control of vegetable crops under greenhouse. He has evaluated the use of closed soilless growing systems in Mediterranean conditions and is currently working on the practical application of a prescriptive-corrective management strategy for the fertigation of soil-grown crops. He has participated in plenty of technical seminars and courses (some of them international) for knowledge dissemination.

Diego Luis Valera Martínez

Prof. Valera is the Director of the BITAL Research Center of the University of Almería, a benchmark in Agri-Food and Biotechnology. He obtained his PhD in Agricultural Engineering at the University of Córdoba and is full a professor at the University of Almería. He has 19 years of experience in forced cultivation, as well as extensive experience developing innovative solutions to make the agricultural model of Almería more competitive. He has received several Awards for his scientific work in International Congresses and for the cooperation between the Research Group and the Industrial and Social sector. He has also received the Best Teacher Award from the Higher Polytechnic School.

Manuel Jamilena Quesada

Full professor of Genetics at UAL. Prof Jamilena research is focused in Genetics, Molecular Biology and Biotechnology. His team's current project is 'Functional genomic tools for the improvement of fruit quality and virus resistance in zucchini squash (Cucurbita pepo)'.

Fernando José Diánez Martínez

Full professor of Agronomy at UAL. Prof. Diánez is specialized in Biological control and plant growth promotion, as well as Horticulture, Plant Pathology, Composting, Pathogens, Plants, Plant Nutrition, Soil Analysis, Plant Development, and Fungi.

Prof. Dr. José Luis Ruiz Real

Professor of marketing at the University of Almería. He has been Secretary General of AECIT (Spanish Association of Scientific Experts in Tourism) and coordinator of the European project IBRAVE (Improvement of Branding for Rural Areas through Vocational Education). He is currently coordinator of the European project RURALTOUR. Both projects seek local development of rural areas through the creation and empowerment of tourism branding territory and entrepreneurship in tourism. He has also participated in local projects, such as the Rumor Project, whose purpose was to position the Alpujarra-Sierra Nevada tourist destination in digital media. He collaborates as an advisor at the Central American Tourism Promotion Agency (CATA). Consultant in the area of marketing at the Florida Institute of Management (Miami, USA), visiting professor at the University Changchun (China), guest professor at numerous universities, such as Julius-Maximilians-Universität Würzburg (Germany), Keimyung University (South Korea), Opole University of Technology (Poland),



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