Syllabus

CLIMATE CONTROL IN GREEN HOUSES - 71604

Last update 12-03-2017

HU Credits: 2

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Soil and Water Sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: Rehovot

Course/Module Coordinator: Meir Teitel

Coordinator Email: grteitel@agri.gov.il

Coordinator Office Hours: By appointment

Teaching Staff:
Dr. Meir Teitel
Course/Module description:
Students will learn the basic principles of greenhouse microclimate management and control. Information on current greenhouse structures and crops grown in greenhouses will be provided. In the first part of the course the students will be introduced to principles of heat transfer, fluid mechanics and psychrometrics. The second part will deal with greenhouse heating, ventilation, cooling, shading, CO2 enrichment, sensors for climate control and basic control and management strategies.

Course/Module aims:
To provide a comprehensive understanding of basic processes in greenhouse microclimate management. To practice quantitative analysis of problems associated with greenhouse microclimate.

Learning outcomes - On successful completion of this module, students should be able to:
On successful completion of this module, students should be able to:
• Describe the current status of greenhouse production in various countries.
• Understand basic principles in heat transfer in greenhouses
• Understand basic principles in air flow in greenhouses
• Understand basic principles in treatment of humid air in greenhouses
• Understand basic principles of measurement of environmental parameters such as temperature, humidity, radiation, wind speed, CO2 concentration, net radiation, soil heat flux.
• Know and understand basic principles of control systems.
• Know and understand the basic principles of microclimate management
• Carry out a principle design and calculations of greenhouse systems for heating, ventilating, cooling, enriching with CO2, shading, etc.

Attendance requirements(%):
70%

Teaching arrangement and method of instruction: Theoretical lectures based on powerpoint presentations and exercises.

Course/Module Content:
Lectures 1, 2 - Background - general terms and overview of climate management systems in greenhouses: heating, carbon dioxide enrichment (CO2), ventilation, cooling, shading, measurable climate control.
Lectures 3, 4, 5 - Principles of heat transfer: conduction, convection and radiation, solar radiation, flow principles.

Lecture 6 - processes of heating systems and hot water and hot air.

Lecture 7 - psychrometerics and features air incubator.

Lecture 8, 9 - Ventilation and cooling processes: natural and forced ventilation, use of nets against insects, damp mattress and obfuscation, fans.

Lecture 10 - climate controlled greenhouses tour.

Lecture 11 - teen Bfd"h, principles of measurement of climatic parameters in greenhouses.

Lectures 12, 13, 14 - Basic Concepts control, algebra of block diagram, the reactions of processes and components in monitoring, analyzing physical processes in a constant state, modes of controllers, industrial, mental first-order dynamic analysis of the physical processes that constitute arrears first-order lag second order, closed-loop control systems, implementation of control systems in greenhouses.

**Required Reading:**
None

**Additional Reading Material:**

**Course/Module evaluation:**
End of year written/oral examination 60 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 20 %
Reports 0 %
Research project 0 %
Quizzes 20 %
Other 0 %

Additional information:
Oral exam at the end of the semester is on a Final Exercise (at home) that will be given to each pair of students. Quiz and exercise scores are backup and only taken into account if they do not reduce the average.