COURSE OUTLINE

1. GENERAL

FACULTY	AGRICULTURAL PRODUCTION, INFRASTRUCTURE AND ENVIRONMENT		
SECTION	UTILIZATION OF NATURAL RESOURCES & AGRICULTURAL ENGINEERING		
LEVEL OF STUDY			
COURSE CODE	67	**SEMESTER OF STUDY**	8Th
COURSE TITLE	GREENHOUSE FACILITIES		

INDEPENDENT TEACHING ACTIVITIES *in case credits are awarded in distinct parts of the course e.g. Lectures, Laboratory Exercises etc. If the credits are awarded uniformly for the entire course, indicate the weekly teaching hours and the total of credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
LECTURES	3	5
TUTORIAL EXERCISES	2	
Add rows if needed. Teaching organization and didactics Methods used are described in detail in 4.		

COURSE TYPE *background, general knowledge, scientific area, development Skill*	SCIENTIFIC AREA
PREREQUISITE COURSES :	• NATURAL • PLANT PHYSIOLOGY
LANGUAGE OF INSTRUCTION and EXAMINATION:	GREEK
THE COURSE IS OFFERED IN ERASMUS STUDENTS	NO
WEBSITE COURSE (URL)	

2. LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course are described, the specific knowledge, skills and competences appropriate level that students will acquire upon successful completion of the course.

Consult Appendix A

- *Description of the Level of Learning Outcomes for each cycle of study according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning*

and Appendix B

- *Learning Outcomes Writing Summary Guide*

Students, upon successful completion of the course, will be able to:

- Understand the basic characteristics of solar radiation regarding the operation of greenhouses
- Understand the properties of different rigid and flexible greenhouse covering materials and select the appropriate materials for each crop and type of greenhouse and maintain them in a similar way
- Understand the behavior and characteristic properties of greenhouse construction materials (wood, aluminum and steel) and choose based on a combination of criteria regarding functionality, cost, compatibility with covering materials, etc.
- Understand and apply greenhouse design criteria for greenhouse type selection, geometric characteristics, structural features and covering materials, foundation, drainage, siting, taking into account impacts on the microclimate, functionality, cost, wind loads and other actions, etc.
- Understand the natural phenomena related to the greenhouse microclimate
- They have knowledge of the basic technologies used in greenhouses ....

General Competencies

Taking into account the general competences that the graduate must have acquired (as listed in the Annex) Diploma and listed below) which of them is the course aimed at?.

Search, analyze and synthesize data and information, using the necessary technologies
Adapting to new situations Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Generating new research ideas
Project planning and management
Respect for diversity and multiculturalism Respect for the natural environment
Demonstrate social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Promoting free, creative and inductive thinking

Search, analyze and synthesize data and information, using the necessary technologies
Decision-making
Autonomous laboratory work / Teamwork Design and management of greenhouses
Promote free, creative and inductive thinking in systems and materials selection

3. COURSE CONTENT

1. Introduction (historical review, statistics, types of greenhouses, greenhouse crops)
2. Radiation (General, electromagnetic radiation, solar radiation spectrum, solar radiation intensity, calculation of incident solar radiation)
3. Solar radiation and plants, factors that favor natural lighting
4. Greenhouse covering materials – glazing (generally for glass, glazing, types of glazing, properties and behavior of glazing as greenhouse covering materials)
5. Greenhouse covering materials – plastics (generally polymers and plastics, rigid and flexible plastic sheets as greenhouse covering materials, characteristics and behavior of selected rigid and flexible plastic sheets, polyethylene sheets, behavior and characteristic properties, the effect of additives on polyethylene sheets)
6. Construction materials (General wood, structural wood as greenhouse construction material, characteristic properties and behavior of wooden greenhouses, protection. General about aluminum and steel, aluminum and steel as greenhouse construction materials, characteristic properties and behavior of metal greenhouses made of aluminum and steel, protection)
7. Greenhouse design (greenhouse design criteria, types of greenhouses and their structural

characteristics, impact on the microclimate, functionality, cost, support of covering materials, foundation, drainage, wind loads, siting)

8. Microclimate - Heat and Humidity
9. Ventilation (systems, equipment)
10. Heating (systems, equipment)
11. Cooling – Cooling, Regulation of relative humidity
12. Artificial lighting, CO2 enrichment, Disinfection
13. Mechanization and automation (general

introduction) Workshop:

1. Demonstration of greenhouses and description of covering materials and greenhouse shapes
2. Central heating study
3. Power calculation of the heating system

4. Plastic transparent perforated pipes on the roof for the distribution of warm air in the greenhouse
5. Calculation of pipe length in the classic heating system with hot water pipes
6. Greenhouse ventilation
7. Cooling the greenhouse
8. Techno-economic feasibility study of a greenhouse enterprise

4. TEACHING AND LEARNING METHODS - ASSESSMENT

DELIVERY METHOD *Face-to-face, Remote education, etc.*	Face to face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in Teaching, Laboratory Training, Communication with students*	✓ Use of ICT in Teaching and Communication with students
TEACHING ORGANIZATION *The method and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliography Study & Analysis, Tutorial, Internship (Placement), Clinical Practicing, Art Workshop, Interactive Teaching, Educational visits, Project Writing, Writing a project / assignments, Artistic creation, etc.* *The student's study hours for each learning activity are listed as well as the hours of unguided study so that the total workload at semester level corresponds to its standards ECTS*	

Activity	***Workload Semester***
Lectures	75
Laboratory exercise and Field exercise	50
TOTAL	***125***

STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Summative, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay/ Report, Oral Examination, Public Presentation, Laboratory Work, Clinical Examination of a Patient, Artistic Interpretation, Other / Others* *Explicitly defined criteria are mentioned assessment and whether and where they are accessible by students.*	• Course attendance - Class participation • Short answer questions • Solving laboratory exercises • Final examination of the entire syllabus that will be used for the overall evaluation of students in combination with the laboratory results

5. RECOMMENDED-BIBLIOGRAPHY

-Suggested Bibliography :
-Related scientific journals:

- Greenhouses D' Edition, G. MAVROGIANNOPOULOS, A. STAMOULIS, 2005 ATHENS 22835
- Greenhouses, Business Floriculture I, James Boodley, Stella Parikou & Co. 1999 ATHENS 14624