DEREE COLLEGE SYLLABUS FOR:

ES 4125 SUSTAINABLE FOOD PRODUCTION: SOIL AND ENVIRONMENT **3/0/3**
(previously ES 4225)

UK LEVEL: 6
UK CREDITS: 15

(Updated Fall 2022)

PREREQUISITES:	ES1000 Environmental Science: Ecosystems and Biodiversity
CATALOG DESCRIPTION:	An integrated approach to soil fertility and sustainable food production. The principles of soil formation and self-sustaining soil systems, biodiversity, biologically grown food, irrigation, water management and social values are also discussed. Focus on crops and livestock management cases, minimizing the severe irreversible soil damages to Mediterranean ecosystems. Sustainable food production and organic farming for the society. Food as a product, food policies.
RATIONALE:	The course discusses soils and sustainable agriculture. Principles and practices comprehensively explain how this is achieved, providing an inclusive look at the underlying theories, concepts, and practices. This allows the student to explore the range of possibilities of the nature/agricultural interface and soil system, to view sustainability in its entirety, all while providing a clear understanding of the inherent complexity. Threats to crop productivity such as soil depletion, drought, plant-eating insects, heat and cold stresses, weeds, and small and large animals as well as socio-economic aspects are discussed in brief. The course provides essential knowledge and skills for environmental studies majors who wish to pursue careers in environmental research, agroecology and natural resources management or agricultural systems and food production.
LEARNING OUTCOMES:	After having taken this course, the student should be able to: 1. Demonstrate knowledge of soil science essentials and of conventional agricultural methods and understanding of the impact of conventional agriculture on the environment (soil, water, atmosphere, biodiversity) and human health. 2. Demonstrate knowledge of concepts and applications of sustainable agriculture. 3. Apply the knowledge on soil science, conventional and sustainable agriculture to selected case studies and critically evaluate approaches used to address specific problems. 4. Assess a specific topic related to agriculture and organic farming by collecting data and information, critically appraise adopted methods and processes and propose relevant solutions, finally, planning and composing a project report. 5. Demonstrate ability to communicate research findings effectively in several forms (e.g. written, graphical and verbal), and defend them in a professional manner. 6. Show ability to describe and record materials in the field and to interpret practical results in a logical manner.
METHOD OF TEACHING AND LEARNING:	In congruence with the learning and teaching strategy of the college, the following tools are used: • Class lectures, interactive learning (class discussions, group work), video presentations, and case studies and practical problems solved in class. • Exercises and primary source documents are assigned as homework and are discussed and reviewed in class • Field Trip / Project work

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Invited speakers on special topics, market experts, professionals
Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.
Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. In congruence with the learning and teaching strategy of the college, the following tools are used:

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<tr><td>ASSESSMENT:</td><td>
Summative:
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<tr><td>Project (3,000-3,500 words)</td><td>50%</td></tr>
<tr><td>Final examination (2 hours)</td><td>50%</td></tr>
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Formative:
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<tr><td>Critical response to selected questions during the semester – including a sample test</td><td>0</td></tr>
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The formative tests aim to prepare students for the final examination and for the research project.
The student project primarily tests learning outcomes 4, 5 and 6 and, depending on the topic, learning outcomes 1 and/or 2 and/or 3.
The final examination tests learning outcomes 1, 2, and 3.
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<tr><td>INDICATIVE READING:</td><td>
Required Reading:

Brady, N.C. and Weil, R. 2008. The Nature and Properties of Soils. Prentice Hall, 14th edition

Recommended Readings:

Altieri, M.A. 1995. Agroecology: The Science Of Sustainable Agriculture. Boulder, Colorado: Westview Press
Brady, N.C. and Weil, R. 2010. Elements of the Nature and Properties of Soils. Prentice Hall, 3rd edition
Dingus, D.D. 1999. Soil Science Laboratory Manual. Prentice Hall

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<tr><td>INDICATIVE MATERIAL:
(e.g. audiovisual, digital material, etc.)</td><td>
REQUIRED MATERIAL:
N/A

RECOMMENDED MATERIAL:
N/A
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<tr><td>COMMUNICATION REQUIREMENTS:</td><td>Verbal skills using academic/professional English</td></tr>
<tr><td>SOFTWARE REQUIREMENTS:</td><td>Word, PowerPoint, Excel</td></tr>
<tr><td>WWW RESOURCES:</td><td>

Pearson Higher Education: www.pearsonhighered.com/bradyweil/
Sustainable Agriculture, Research and Education: www.sare.org/publications/index.htm
www.attra.ncat.org/fundamental.html
Agroecology: principles and strategies for designing sustainable farming systems www.CNR.Berkeley.EDU/%7Eagroeco3/principles_and_strategies.html
Alternative Farming Systems Information Center www.nal.usda.gov/afsic

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	• Sustainable Agriculture: Definitions and Terms www.nal.usda.gov/afsic/AFSIC_pubs/srb9902.htm • ATTRA—National Sustainable Agriculture Information Service www.attra.ncat.org • Future Horizons: Recent Literature in Sustainable Agriculture http://ianrwww.unl.edu/ianr/csas/extvol6.htm • John Ikerd's Series of Papers on Sustainable Agriculture www.ssu.missouri.edu/faculty/Jikerd/papers/default.htm • Land Stewardship Project www.landstewardshipproject.org/ • Leopold Center for Sustainable Agriculture www.leopold.iastate.edu • Minnesota Institute for Sustainable Agriculture www.misa.umn.edu/ • National Campaign for Sustainable Agriculture www.sustainableagriculture.net • Sustainable Agriculture Network www.sare.org • University of California Sustainable Agriculture Research and Education Program www.sarep.ucdavis.edu/
INDICATIVE CONTENT:	THE SOIL SYSTEM • The Soils Around Us - Soil system and critical fertility factors • Agricultural production systems, conventional agriculture, biological agriculture • Sustainable agriculture goals, (quality of life, profit and minimum disturbance of the natural ecosystem) • Environmental impacts from cultivation practices • Spatial principles, with resource concepts such as capture, production, balance, and biodiversity • Soils of Dry Regions - Planting densities, ratios, and spatial patterns • Facilitation of nutrient and water capture-transfer • Human Managed Ecosystem governance SUSTAINABILITY • Sustainability Issues • Threats, such as drought, wind, flood, temperature, and fire • Biodiversity (use of fences, repellent plants, fauna, and other means to stave off large animal threats) • Organisms and Ecology of the Soil - Basic Insect Countermeasures • Current food production policy - Agrotechnologies • Soil Erosion and Its Control - Land Modification • Monocultures & Seasonal intercropping – FOOD • Principles of Organic food production- Use of Reservoirs, Corridors, Wind structures, Riparian buffers, Firebreaks, and other Means as Auxiliary Systems • Soils and Chemical Pollution Land Modification SOCIOECONOMICS • Social and Community Agroecology

	• Core approaches to alternative agriculture, including genetic, microbial, varietal, rotational, and others • Premium Markets. • Added Value • Socio-economic Issues • International food policies and politics **FIELD ACTIVITY OUTLINE** 1. Soil sampling, texture and fertility 2. Ground morphology and characteristics 3. Biodiversity measurements 4. Social perception & product exploitation 5. Organic farming parameters comparative analysis and indicators