UNIVERSITY OF SARGODHA

DEPARTMENT OF AGRONOMY, COLLEGE OF AGRICULTURE

COURSE OUTLINE FALL 2020-2021

Course Title: ENVIRONMENT AND CROP PRODUCTION

Course Code: AGRO-409

Credit Hours: 3(2-1)

Instructor: Dr. Muhammad Rafi Qamar

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| **DESCRIPTION** |

This course provides theoretical and practical skill in the students regarding crop production under changing environmental conditions and how environmental factors influence on the food security in the recent scenario. Dynamics in environmental conditions at aerial and soil levels have variable effect on crop growth and development. Different environmental factors like temperature, relative humidity, wind and CO2 have significant effect on crop production. This course explains the sources of greenhouse gasses emission and their effect on agricultural/crop production. In this course, crop adaptation strategies are studied under changing environmental and climatic conditions.

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| LEARNING OUTCOMES |

The key objectives/outcomes of this course are;

* To introduce the students how different environmental factors influences crop production.
* To familiar’s students to different climatic factors and their effect on crop production.
* To study effect of drought on growth, yield and quality of crop yield.
* To study greenhouse effect on crop production.

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| CONTENTS |

**THEORY**

1. Environment, climate change and food security.
2. Types and classification of environment
3. Dynamics of aerial and soil environment in a crop canopy at macro and micro level.
4. Influence of different environmental factors;
5. Radiation
6. Temperature
7. Water
8. Wind
9. CO2
10. Vapour pressure
11. Photosynthesis.
12. Respiration.
13. Transpiration.
14. Greenhouse effect on crop production.
15. *El Nino and La Nino* phenomenon.
16. Crop adaptation to changing climate.

**PRACTICAL**

1. Measurements and estimation of different environmental variables.
2. Calculations of potential evapotranspiration and different drought indices.
3. Measurement of solar radiation in crops.

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| READINGS |

1. Allaby, M. 2000. Basics of Environmental Science. Rutledge, London & New York.
2. Dris, R., J. Mohan and I.A. Khan. 2002. Environment and Crop Production. Science Pub. Inc., New York.
3. Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India.
4. Hammer, G.L., N. Nicholls and C. Mitchell. 2000 Application of Seasonal Climate Forecasting in Agricultural and Natural Ecosystems. Kluwer Academic Publisher, London.
5. Crops and Environmental Change. International Book Distributing Co. India.
6. Rowan Sewing, C., T.T. Richer, J.W. Jael. G.Y. Tsuji and Hi Ledyard. 1995. Climate Change Agriculture: Analysis of Potential international impact ASA Special Publication, USA.

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| **COURSE** |
| Week | Topics and Readings | Book with Page No |
| 1 | What is environmental Science? The greenhouse effect, Food system and food security | Basics of Environmental Science. Rutledge, London & New York. Page # 01-51 |
| 2 | Climate and climate change. Climate change, food security and nutrition  | Basics of Environmental Science. Rutledge, London & New York. Page # 64-80 |
| 3 | Climate and climate change. Climate change, food security and nutrition  | Basics of Environmental Science. Rutledge, London & New York. Page # 64-80 |
| 4 | Environmental Changes, Crops and Food Supply Interactive Effects of Environmental Changes on Yield. | Crops and Environmental Change. International Book Distributing Co. India. Page # 04-27 and 307-310 |
| 5 | Climate Change and Crop Productivity, Crop adaptation to changing climate | Crop Production Under Diverse Environments: Pointer Publishers India. Page # 01-12 |
| 6 | Global Warming and Co2 Sequestration: Future Carbon Economy for Plant Productivity | Crop Production Under Diverse Environments: Pointer Publishers India. Page # 123-128 |
| 7 | Solar Radiation and Its Role in Plant Growth, Environmental Temperature and Crop Production | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. Page # 13-66 |
| 8 | Environmental Temperature and Crop Production | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 43-66 |
|  | **Mid Term Examination** |  |
| 9 | Environmental Temperature and Crop Production | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 43-66 |
| 10 | Environmental Temperature and Crop Production | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 43-66 |
| 11 | Climatological Methods for Managing Farm Water Resources | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 69-91 |
| 12 | Effect of drought on growth, Drought Monitoring and Planning for Mitigation | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 95-119 |
| 13 | Climate, Crop Pests and Parasites of Animals | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 123-138 |
| 14 | Remote-Sensing Applications in Agrometeorology | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 145-161 |
| 15 | Climate Change and Its Impact on Agriculture | Agrometeorology Principles and Applications of Climate Studies in Agriculture: International Book Distributing Co. India. Page # 263-286 |
| 16 | *El Nino and La Nino* phenomenon | Crop Production Under Diverse Environments: Pointer Publishers India. Page # 157-165 |
| 17 | Plant growth process: Effects of Environmental Conditions and Changes on Photosynthesis, Respiration and Transpiration. | Crops and Environmental Change. International Book Distributing Co. India. Page # 51-80 |
| 18 | Plant growth process: Effects of Environmental Conditions and Changes on Photosynthesis, Respiration and Transpiration. | Crops and Environmental Change. International Book Distributing Co. India. Page # 51-80 |

***Note****: You can reserve one week for sessional or mid-term exam, and if you wish, one week for student presentations of the assigned research project*

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| RESEARCH PROJECT/ PRACTICAL/LABS |

*State here the prerequisites of the assigned research project including term paper or lab assignment etc.*

* Lab experiments will be conducted at different environmental conditions
* Pot experiments will be conducted in the green house to evaluate the environmental stress on plants growth and development.

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| **ASSIGNMENT CRITERIA** |

*Write here the distribution of marks. You can choose any or all from the below for the purpose*

Sessional: 02

Project: 02

Presentation: 02

Participation: 02

Mid-term: 12

Final-Exam: 20

Practical: 20