UNIVERSITY OF SARGODHA

DEPARTMENT OF AGRONOMY, COLLEGE OF AGRICULTURE

COURSE OUTLINE Fall 2020

Course Title: Introduction to Crop Modeling

Course Code: AGRO-407

Credit Hours: 3(2-1)

Instructor: Dr. Amjed Ali

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| **DESCRIPTION** |

Crop modeling encompasses many diverse interests and emerging problems, especially climate change. The need to address crop management regarding fertilizer application, water requirement to promote sustainable agricultural production by crop modeling.

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| **LEARNING OUTCOMES** |

The key objectives of the course are:

* To introduce the students with concept of crop modeling
* To enable students to use different models in agriculture
* To assess the climate risks, and its mitigation as well as adaptation

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| **CONTENTS** |

1. History and introduction of crop growth modeling
2. Importance and uses
3. Introduction to decision support system for agro-technology transfer
4. Components of a model
5. Input data set for different models
6. Modeling and crop improvement
7. Modeling: a tool for future predictions

**Practical**

1. Demonstration and practice of crop growth models:
2. CERES-wheat, DSSAT V.4.6,
3. APSIM,
4. Measurement of different environmental variables from observatories.

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| **READINGS** |

1. Mavi, H.S. and G.J. Tupper. 2005. Agro meteorology Principles and Application of Climate Studies in Agriculture. International Book Distribution Co., Lucknow, India.
2. Tsuji, G. Y., G. Hoogenboom and P. K. Thornton. 1998. Understanding options for Agricultural Production**.** Springer, The Netherland.
3. Radha Krishna Murthy, V. 2000. Crop Growth Modeling and its applications in Agricultural Meterology. Wageningen, The Netherlands
4. Sivakumar, M.V.K. and J. Hansen. 2007. Climate Predictions and Agriculture. Springer, Berlin, Heidelberg, New York.
5. Sivakumar, M.V.K. and R.P. Motha. 2005. Increasing Climate Variability and Change: Reducing the vulnerability of agriculture and forestry. Springer, Dordrecht, The Netherland.

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| **COURSE** |

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| **Week** | **Topics and Readings** | **Book with Page No.** |
| 1 | Introduction of crop growth modeling, discussion about course contents | Understanding options for Agriculture Production, Page, 1-20 |
| Introduction of crop growth modeling | ----------------------- |
| Introduction of crop growth modeling | --------------------- |
| 2 | Types of models |  |
| Types of models | --------------------------- |
| Types of models | ----------------------------- |
| 3 | History of crop growth modeling | Crop simulation Modeling, Page 289-293 |
| History of crop growth modeling | ------------------------ |
| History of crop growth modeling | -------------------------- |
| 4 | Possible application of crop models | Agro meteorology Principles and Application of Climate Studies in Agriculture. Page, 127-150 |
| Possible application of crop models | ---------------------------- |
| Possible application of crop models | ----------------------------- |
| 5 | Importance and uses |  |
| Importance and uses | ------------------------ |
| Limitations, Future Consideration of crop modeling | ------------------------ |
| 6 | Introduction to decision support system for agro-technology transfer | Understanding options for Agriculture Production, Page, 157-174 |
| Introduction to decision support system for agro-technology transfer | -------------------------- |
| Introduction to decision support system for agro-technology transfer | ---------------------------- |
| 7 | Introduction to decision support system for agro-technology transfer | Crop Simulation Modeling, Page , 294-298 |
| Introduction to decision support system for agro-technology transfer | ------------------------- |
| Introduction to decision support system for agro-technology transfer | ------------------------- |
| 8 | Introduction to decision support system for agro-technology transfer | https://www.managementstudyguide.com/decision-support-systems.htm |
| Introduction to decision support system for agro-technology transfer | https://dssat.net/wp-content/uploads/2011/10/DSSAT-vol4.pdf |
| Introduction to decision support system for agro-technology transfer | ---------------------------- |
|  | **MID TERM EXAM** |  |
| 9 | Components of a model | Understanding options for Agriculture Production, Page, 9-15 |
| Components of a model | ----------------------------- |
| Components of a model | ----------------------------- |
| 10 | Components of a model | Understanding options for Agriculture Production, Page, 16-25 |
| Components of a model | ------------------------------ |
| Components of a model | ------------------------------- |
| 11 | Input data sets for different models | Understanding options for Agriculture Production, Page, 26-30 |
| Input data sets for different models |  |
| Input data sets for different models | ------------------------------------ |
| 12 | Input data sets for different models | Understanding options for Agriculture Production, Page, 313-323 |
| Input data sets for different models | ------------------------------------ |
| Input data sets for different models | ----------------------------- |
| 13 | Modeling and crop improvement | Understanding options for Agriculture Production, Page, 179-188 |
| Modeling and crop improvement | --------------------------- |
| Modeling and crop improvement | --------------------------- |
| 14 | Modeling and crop improvement | ----------------------------- |
| Modeling and crop improvement | ----------------------------- |
| Modeling and crop improvement | -------------------------------- |
| 15 | Modeling: a tool for future predictions | Understanding options for Agriculture Production, Page, 267-275 |
| Modeling: a tool for future predictions | ------------------------------- |
| Modeling: a tool for future predictions | ------------------------------- |
| 16 | Modeling: a tool for future predictions | -------------------------------- |
| Modeling: a tool for future predictions | -------------------------------- |
| Modeling: a tool for future predictions | -------------------------------- |
| 17 | Final Exam | |

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| **RESEARCH PROJECT / PRACTICAL / LABS** |

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| **Week** | **Practical Lab** | **Practical** |
| 1 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 2 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 3 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 4 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 5 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 6 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 7 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 8 | Demonstration and practice of crop growth models | DSSAT V4.7 |
| 9 | Demonstration and practice of crop growth models | APSIM |
| 10 | Demonstration and practice of crop growth models | APSIM |
| 11 | Demonstration and practice of crop growth models | APSIM |
| 12 | Demonstration and practice of crop growth models | APSIM |
| 13 | Demonstration and practice of crop growth models | APSIM |
| 14 | Demonstration and practice of crop growth models | APSIM |
| 15 | Measurement of different environmental variables from observatories | In the field |
| 16 | Measurement of different environmental variables from observatories | In the field |
| 17 | Final Exam | |

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| **ASSIGNMENT CRITERIA** |

Sessional: 5

Project: 5

Presentation: 5

Participation: 5