ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences and Business

COURSE: AGR 1000 Introduction to Field Crop Science

Date: Spring 2023

Credit Hours: 4

Complete all that apply or mark "None" where appropriate:

Prerequisite(s): None

Enrollment by assessment or other measure? ☐ Yes ☒ No
If yes, please describe:

Corequisite(s): None

Pre- or Corequiste(s): None

Consent of Instructor: ☐ Yes ☒ No

Delivery Method:		
☒ **Lecture**	**3 Contact Hours** (1 contact = 1 credit hour)
☐ **Seminar**	**0 Contact Hours** (1 contact = 1 credit hour)
☒ **Lab**	**2 Contact Hours** (2-3 contact = 1 credit hour)
☐ **Clinical**	**0 Contact Hours** (3 contact = 1 credit hour)

Offered: ☒ **Fall** ☒ **Spring** ☐ **Summer**

CATALOG DESCRIPTION and IAI NUMBER (if applicable):
The basic principles of plant growth, including human and environmental influences and the theoretical and practical application of agronomic principles to crop production. Includes the historical and economic importance of crop plants for food, feed, and fiber; origin, classification, and geographic distribution of field crops; environmental factors and agronomic problems; crop plant breeding, growth, development, and physiology; cropping systems and practices; seedbed preparation, tillage, and crop establishment; pests and controls; and harvesting, storing, and marketing practices.

ACCREDITATION STATEMENTS AND COURSE NOTES:
None

COURSE TOPICS AND CONTENT REQUIREMENTS:

1. Importance of Crop Plants - Food, Feed, Fiber, Fuel
    A. Contributions
        i. To humankind and their welfare
        ii. To the GDP
        iii. To state gross product
        iv. To balance of trade, etc…
    B. Historical Significance
    C. Economics
        i. Social
        ii. Comparative Advantage
        iii. Markets
        iv. Transportation
        v. Population
2. Origin, Classification, and Geographic Distribution of Field Crops
3. Important Field Crops of the World
    A. Grain
    B. Oil
    C. Fiber
    D. Sugar
    E. Drug
    F. Forage
    G. Biofuel
4. Crop Environmental Factors
    A. Air
    B. Light
    C. Moisture (Water)
    D. Temperature
    E. Soil
5. Agronomic Problems, Perceptions and Questions
    A. World Population and Food Supply
    B. Pollution - Air, Water, Soil
    C. Organic and Sustainable Agriculture
    D. Energy
    E. Pesticides and Human Health
6. Growth and Development of Crop Plants 4 – 6
    A. Botany of Plants
        i. Anatomy
        ii. Morphology
    B. Identification
        i. Seeds
        ii. Crop Plants
    C. Form and Function

i. Structure
ii. Function

D. Crop Propagation
i. Asexual Propagation - Vegetative
ii. Sexual Propagation – Seed
I. Seed Quality
II. State Laws
III. Crop Improvement Association (certified seed)

E. Growth Regulation and Development - Plant Regulators in Agriculture Today and in the Future

7. Crop Physiology
A. Essential Elements and Plant Nutrition
B. Role of Water and Water Management
C. Photosynthesis / Respiration

8. Cropping Systems and Practices
A. Monoculture
B. Rotation
C. Multiple Cropping and Intercropping
D. GIS/GPS Site Specific Applications
E. Organic Cropping Systems
F. Seedbed Preparation
G. Stand Establishment - Seeding Methods, etc…
H. Conservation Tillage Systems and Practices
i. Harvesting and Storing

9. Cover Crops

10. Integrated Pest Management
A. Pests Control and Resistance Management
i. Insects
ii. Diseases
iii. Weeds
iv. Nematodes

11. Crop Breeding and Improvement
A. Genetics
B. Plant Introduction
C. Selection
D. Hybridization
E. Mutation
F. Genetic Modification
G. Value Added Traits
H. Biotechnology

INSTRUCTIONAL METHODS:

- Lecture
- Discussion
- Student reports
- Lab demonstration

- Hands-on activities

EVALUATION OF STUDENT ACHIEVEMENT:
A= 90-100
B= 80-89
C= 70-79
D= 60-69
F= 0-59

Exams & Quizzes – 60%
Assignments (written and lab work) – 30%
Student attendance & class/lab participation – 10%

INSTRUCTIONAL MATERIALS:
Textbooks
Crop Science: Principles and Practices - R. Mullen, 4/E, Pearson Custom Publishing
Introduction to Plant Science - R. Parker - Cengage Learning.
Plant Science: Growth, Development, and Utilization of Cultivated Plants, 5E - M. McMahon, A. Kofranek, and V. Rubatzky, Pearson.
Principles of Field Crop Production 4/E - J. Martin, R. Waldren, D. Stamp, and W. Leonard, Pearson.
Principles of Crop Production: Theory, Techniques, and Technology, 2/E – G. Acquaah, Pearson.
Introduction to Agronomy: Food, Crops, and Environment - Sheaffer & Moncada, Cengage Learning
Plant and Soil Science: Fundamentals & Applications - R. Parker, Cengage Learning

Resources
- Modern Corn and Soybean Production. R. Hoeft, E. Nafziger, R. Johnson, and S. Aldrich, MCSP Publications. (http://www.mcsp-pubs.com/)
- Illinois Pesticide Applicator Training Manuals. Pubs Plus, University of Illinois. http://web.extension.illinois.edu/privatepsep/
- Plant Pathology - Plant Disease Series (RPD), University of Illinois VISTA. (http://www.aces.uiuc.edu/vista/rpd.html)
- Field Crop Scouting Manual. Pubs Plus, University of Illinois. (https://pubsplus.uiuc.edu/index.html) Weeds of the
- Great Plains. Nebraska Department of Agriculture. (http://www.agr.state.ne.us/forms/nw11.pdf)
- Crop Production. J. Vorst. (http://www.stipes.com/agriculture.html).
- Corn & Soybean Field Guide. Purdue University. (http://www.ag.purdue.edu/agry/dtc/Pages/fieldguide.aspx)
- Ag Forage Field Guide, Purdue University – currently not available. (https://secure.agriculture.purdue.edu/store/default.asp)
- Crop Production: Evolution, History, and Technology. C. Wayne Smith. Wiley.
- Alfalfa Management Guide. D. Undersander, R. Becker, D. Cosgrove, E. Cullen, J. Doll, C. Grau, K. Kelling, M. Rice

- M. Schmitt. American Society of Agronomy. Illinois Agronomy Handbook, details Crop Sciences Lab Manual, ITCS.
- Weeds of the South by Charles T. Bryson and Michael S. DeFelice. University of Georgia Press
- Weeds of the Midwest by Charles T. Bryson and Michael S. DeFelice. University of Georgia Press Purdue
- Crop Management CDs http://www.agriculture.purdue.edu/agcrop/
- Pastures for Horses: A Guide to Rotational Grazing CD http://learningstore.uwex.edu/%2FPastures-for-Horses-A-Guide-to-Rotational-GrazingCD-P98.aspx
- Herbicide Mode of Action and Crop Injury Symptoms CD http://shop.extension.umn.edu/Default.aspx Illinois
- Agricultural Education Curriculum Resources http://www.agriculturaleducation.org/curriculum/
- YouTube
- History Channel
- USDA National Agricultural Statistics Service (NASS) http://www.nass.usda.gov/
- How a Corn Plant Develops http://www.biologie.unihamburg.de/bonline/library/maize/www.ag.iastate.edu/departments/agronomy/corngrows.html
- How the Soybean Plant Develops http://extension.agron.iastate.edu/soybean/production_growthstages.html Soybean
- Diagnostic Guide http://www.plantsci.missouri.edu/soydoc/startup.htm
- Pest Management and Crop Development Newsletter (University of Illinois) http://www.ipm.uiuc.edu/bulletin/index.php Purdue
- Forage Information http://www.agry.purdue.edu/ext/forages/
- University of Illinois IPM http://www.ipm.uiuc.edu/fieldcrops/index.html
- Illinois Agricultural Education http://www.agriculturaleducation.org
- Illinois High School Curriculum http://www.mycaert.com

LEARNING OUTCOMES AND GOALS:

Institutional Learning Outcomes

☒ 1) Communication – to communicate effectively;

☒ 2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion;

☐ 3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally;

☐ 4) Responsibility – to recognize how personal choices affect self and society.

Course Outcomes and Competencies

1. Identify and explain the importance of crops on world food production.
   Competency 1.1 – Students will be able to identify and discuss the relationship between world population and food supply.

Competency 1.2 – Students will be able to discuss and identify crop contributions that are important to humankind, the GDP, the state gross product, and the balance of trade.
Competency 1.3 – Students will be able to discuss and identify crop contributions that are of historical significance.
Competency 1.4 – Students will be able to discuss and identify crop contributions that are of economic importance.
Competency 1.5 – Students will be able to identify and discuss crop origins.
Competency 1.6 – Students will be able to identify and discuss the plant classification system.
Competency 1.7 – Students will be able to identify and discuss the geographic distribution of field crops.
Competency 1.8 – Students will be able to identify and discuss grain crops.
Competency 1.9 – Students will be able to identify and discuss oil crops.
Competency 1.10 – Students will be able to identify and discuss fiber crops.
Competency 1.11 – Students will be able to identify and discuss sugar crops.
Competency 1.12 - Students will be able to identify and discuss crops that are used for drugs.
Competency 1.13 - Students will be able to identify and discuss forage crops.

2. Identify and describe the basic principles of plant growth.
Competency 2.1–Students will be able to identify and discuss plant need for air.
Competency 2.2–Students will be able to identify and discuss plant need for light.
Competency 2.3–Students will be able to identify and discuss plant need for water.
Competency 2.4–Students will be able to identify and discuss plant response to temperature
Competency 2.5–Students will be able to identify and discuss plant need for soil.
Competency 2.6-Students will be able to identify and discuss plant anatomy and morphology.
Competency 2.7-Students will be able to identify crop seeds and plants
Competency 2.8-Students will be able to identify plants by structure and function
Competency 2.9-Students will be able to identify and discuss methods of crop propagation.
Competency 2.10-Students will be able to identify and discuss plant growth regulators and development today and in the future.
Competency 2.11-Students will be able to identify essential elements required for plant nutrition.
Competency 2.12-Students will be able to identify and discuss the role of water and water management in crop production.
Competency 2.13-Students will be able to identify the components required for photosynthesis to occur.

3. Evaluate the theoretical and practical aspects of agronomic principles.
Competency 3.1 – Students will be able to identify and discuss issues related to air, water, and soil pollution.
Competency 3.2 – Students will be able to identify and discuss issues related to organic crops and sustainable agriculture.
Competency 3.3 – Students will be able to identify and discuss issues related to energy and crop production.

Competency 3.4 – Students will be able to identify and discuss issues related to pesticide use and human health.
Competency 3.5 - Students will be able to identify and discuss monocultures, rotations, intercropping, GPS, Organic cropping, seedbed preparation, stand establishment, and conservation tillage systems.
Competency 3.6 - Students will be able to identify and discuss crop pests including insects, diseases, weeds, and nematodes.
Competency 3.7 - Students will be able to identify and discuss crop harvesting, storing, and marketing practices.
Competency 3.8 - Students will be able to identify and discuss crop genetics, crop introduction, crop selection, plant hybridization, plant mutations, genetic enhancement and value-added traits