**Spring 2024**

**Syllabus**

**Introductory Crop (Plant) Science**

Credit: 3-4 semester hours (includes minimum 1 credit hour lab requirement)

No Prerequisite

**Course Description:**

IAI Description: AG 903: *Introduction to Crop or Plant Science* (3-4 semester hours which includes minimum 1 credit hour lab)

The basic principles of plant growth, including human and environmental influences and the theoretical and practical application of agronomic principles to crop production in Illinois, the Midwest, and the United States. 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.

**Objectives:**

1. The student will be able to identify and explain the importance of crops on world food production.

2. Identify and describe the basic principles of plant growth.

3. Evaluate the theoretical and practical aspects of agronomic principles.

**Suggested Texts: (Current Edition)**

*Crop Science: Principles and Practices.* R. Mullen*.* Pearson Custom Publishing.

*Introduction to Plant Science.* R. Parker. Delmar Cengage Learning.

*Plant Science: Growth, Development, and Utilization of Cultivated Plants.* M. McMahon, A. Kofranek, and V. Rubatzky, Pearson.

*Principles of Field Crop Production.* J. Martin, R. Waldren, and D. Stamp, Pearson.

*Principles of Crop Production,* Acquaah.

*Introduction to Agronomy,* Sheaffer & Moncada

*Plant and Soil Science,* R. Parker, Delmar Cengage Learning

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| **Topics:** | | | **Periods** | |
| I. Importance of Crop Plants - Food, Feed, Fiber, Fuel | | | 2 – 4 | |
| A. Contributions | | |  | | |
| 1. To humankind and their welfare | | |  | | |
| 2. To the GDP | | |  | | |
| 3. To state gross product | | |  | | |
| 4. To balance of trade, etc… | | |  | | |
| B. Historical Significance | | |  | | |
| C. Economics | | |  | | |
| 1. Social | | |  | | |
| 2. Comparative Advantage | | |  | | |
| 3. Markets | | |  | | |
| 4. Transportation | | |  | | |
| 5. Population | | |  | | |
| II. Origin, Classification, and Geographic Distribution of Field Crops | | | 2 – 3 | |
| III. Important Field Crops of Illinois, the Midwest, the United States, and the World | | | 1 – 3 | |
| A. Grain | | |  | |
| B. Oil | | |  | |
| C. Fiber | | |  | |
| D. Sugar | | |  | |
| E. Drug | | |  | |
| F. Forage | | |  | |
| G. Biofuel | | |  | |
| IV. Crop Environmental Factors | | | 4 – 6 | |
| A. Air | | |  | |
| B. Light | | |  | |
| C. Moisture (Water) | | |  | |
| D. Temperature | | |  | |
| E. Soil | | |  | |
| V. Agronomic Problems, Perceptions and Questions | | | 3 – 4 | |
| A. World Population and Food Supply | | |  | |
| B. Pollution - Air, Water, Soil | | |  | |
| C. Organic and Sustainable Agriculture | | |  | |
| D. Energy | | |  | |
| E. Pesticides and Human Health | | |  | |
| VI. Growth and Development of Crop Plants | | | 4 – 6 | |
| A. Botany of Plants | | |  | |
| 1. Anatomy | | |  | | |
| 2. Morphology | | |  | | |
| B. Identification | | |  | |
| 1. Seeds | | |  | | |
| 1. Crop Plants 2. Cover Crop Seeds and Plants | | |  | | |
| C. Form and Function | | |  | |
| 1. Structure | | |  | | |
| 2. Function | | |  | | |
| D. Crop Propagation | | |  | |
| 1. Asexual Propagation - Vegetative | | |  | | |
| 2. Sexual Propagation - Seed | | |  | | |
| a. Seed Quality | | | |  | |
| b. State Laws | | | |  | |
| c. Crop Improvement Association (certified seed) | | | |  | |
| E. Growth Regulation and Development - Plant Regulators in  Agriculture Today and in the Future | | |
| VII. Crop Physiology | | | 4 – 6 | |
| A. Essential Elements and Plant Nutrition | | |  | |
| B. Role of Water and Water Management | | |  | |
| C. Photosynthesis / Respiration | | |  | |
| VIII. Cropping Systems and Practices | | | 5 – 7 | |
| 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  J. Cover Crops  K. Carbon Sequestration  L. Greenhouse Gases  M. Biologicals | | |  | |
| IX. Integrated Pest Management | | | 4 – 5 | |
| A. Pests Control and Resistance Management | | |  | | |
| 1. Animals- Insects, Mammals, etc. | | |  | | |
| 2. Diseases | | |  | | |
| 3. Weeds | | |  | | |
| 1. Nematodes | | |  | | |
| X. Crop Breeding and Improvement | | | 3 – 5 | |
| A. Genetics | | |  | | |
| B. Plant Introduction | | |  | | |
| C. Selection | | |  | | |
| D. Hybridization | | |  | | |
| E. Mutation | | |  | | |
| F. Genetic Modification  G. Value Added Traits  H. Biotechnology | | |  | | |
| **Suggested Lab Exercises:**  Agronomy Equipment  Fertilization and Seed Formation  Morphology of Grasses and Legumes  Pest Identification, Scouting and IPM  Grain Grading and Crop Judging  Seed Identification, Quality and Certification  Vegetative and Floral Identification of Crops and Weeds  Germination, Emergence and Seedling Development of Monocots (Corn) and Dicots (Soybeans)  Crop Problem Scenarios (Troubleshooting)  DNA Extraction Exercise  Biotechnology  Tour Agronomic Companies  Yield Checks  Erosion Lab Using Real Farm Information  Research Analysis and Interpretation  Biofuels  Fertilizers and Applications  Cover Crop Labs- including water quality, varieties, etc.  ***Note****: Use of live plants or a series of demonstrations from seeds to mature plant development is recommended.* | | |  | |

**Suggested References**

*Modern Corn and Soybean Production.* R. Hoeft, E. Nafziger, R. Johnson, and S. Aldrich, MCSP Publications. ([http://www.mcsp-pubs.com/](http://www.mcsp-pubs.com/index.ace))

*Illinois Pesticide Applicator Training Manuals.* Pubs Plus, University of Illinois. http://web.extension.illinois.edu/privatepsep/

*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: 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

University of Illinois IPM <https://ipm.illinois.edu/>

USDA National Agricultural Statistics Service (NASS)<http://www.nass.usda.gov/>

How a Corn Plant Develops<https://publications.iowa.gov/18027/1/How%20a%20corn%20plant%20develops001.pdf>

How the Soybean Plant Develops <http://publications.iowa.gov/14855/1/1985%20How%20a%20Soybean%20Plant%20Develops.pdf>

Purdue Crop Management CDs

Purdue Forage Information

<https://ag.purdue.edu/department/agry/agry-extension/forages/forage-id/index.html>

YouTube

History Channel

Khan Academy

Crashcourse Biology

Midwest Covercrop Council

Crop Protection Network

Weeds of the Northeast

Missouri Guide for Mode of Action and Weed ID

Iowa State Corn Nitrogen Rate Calculator

**There are two ways to access Teaching Resources on the** [**www.ilaged.org**](http://www.ilaged.org) **website:**

**For Files Shared by Postsecondary Instructors:**

PATHWAY: [www.ilaged.org](http://www.ilaged.org) –Teach—Postsecondary Instructors—File Sharing & Teaching Resources— **Agronomy** Lesson Sharing

**For Files available from the Illinois Agriculture Education Secondary Curriculum:**

(A log-in is required- this is available through FCAE: <https://www.ilaged.org/Contact>)

PATHWAY: [www.ilaged.org--](http://www.ilaged.org--) Log-in- along left hand side there are two curriculum links: “Curriculum Supplemental Resources” and “Go To MYCAERT Website”