

Virginia Western Community College

AGR 142

Introduction to Plant Science and Technology

Prerequisites

ENG 111

Course Description

Introduces students to plant science, ecology, plant morphology, plant and soil relations and energy conversions. Includes surveying agricultural crops and their importance in the economy.

Semester Credits: 3

Lecture Hours: 2

Laboratory Hours: 3

Required Materials

Textbook:

Plant Science: Growth, Development, and Utilization of Cultivated Plants. McMahon. 6th edition. Pearson Publishing. ISBN: 978-0-13-518482-0

Course Outcomes

At the completion of this course, the student should be able to:

- Explain the importance of food, fiber, and other products derived from plants
- Apply sound principles of soil, water, and fertility management to the cultivation of plants
- Identify the anatomical features of common crop plants and their significance to the structure and physiology of those plants
- Understand and apply principles of sexual and asexual forms of plant propagation
- Describe the effects of plant growth regulators on growth and development of crop plants
- Identify the necessary features of greenhouse and hydroponic management and facilities
- Understand environmentally sound methods for pest and disease management, and the effects of pesticides on the environment

Topical Description

Chapter 1: History, Trends, Issues, and Challenges in Plant Science

- Trends and Issues Affecting Plant Science
- Meeting the Challenges in Plant Science
- Solutions Through Scientific Inquiry

Chapter 2: Terrestrial Ecosystems and Their Relationship to Cultivating Plants

- Ecosystem Components
- Biomes, Climate, and Microclimate
- Ecosystem Components
- Impact of Cultivating Plants on Ecosystems

Chapter 4: Climate and Its Effects on Plants

- Solar Radiation, moisture availability, temperature, air movement

Chapter 5: Soils

- Factors Involved in Soil Formation
- Physical and Chemical Properties of Soil
- Soil Organisms and Organic Matter
- Soil Degradation

Chapter 6: Structure of Higher Plants

- The Life Cycle of a Corn Plant (Monocot)
- The Life Cycle of a Bean Plant (Dicot)
- Plant Cell Structure and Plant Tissues
- The Plant Body

Chapter 7: Plant Growth and Development

- How the Plant Grows
- Stages of Growth and Development
- Reproductive Growth and Development
- Plant Growth Regulators

Chapter 9: Genetics and Propagation

- Plant Selection
- Propagation of Plants
- Sexual/Seed Propagation
- Vegetative Propagation
- Micropropagation (Tissue Culture)
- Biotechnology

Chapter 11: Photosynthesis and Respiration

- Factors Affecting the Rate of Photosynthesis in Higher Plants

Chapter 12: Water Relations

- Soil Water and Plant Water

Chapter 13: Mineral Nutrition

- How Plants Absorb Nutrients from the Soil
- Elements That Plants Need for Growth and Reproduction
- Minor Elements
- Nutrient Deficiency Considerations and Remobilization

Chapter 14: Soil, Water, and Fertility Management

- Land Preparation
- Soil Fumigation and Pasteurization
- Soil Degradation
- Soil Improvement and Conservation

- Water and Fertility Management
- Fertilization Application Methods

Chapter 15: Integrated Management of Weeds, Insects, Diseases, and Other Pests

- Integrated Plant Health Management (PHM)
- Weed Control and Management
- Insects and Mites
- Vertebrates
- Plant Diseases and Other Plant Pests
- Pesticide Effects on the Environment

Ch. 17: Field Crops Grown for Food, Fiber, and Fuel

- Cropping Sequences
- Variety Selection
- Plant and Crop Establishment
- Water Management: Irrigation and Drainage
- Crop Nutrition
- Pest Management
- Harvest and Storage

Ch. 19: Vegetable Production

Ch. 20: Temperature Fruit and Nut Crops

Ch. 23: Controlled Environmental Agriculture

- Overview of Production Systems
 - Managing Environmental Factors
 - Principles of Hydroponic Production
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Laboratory Topics (not listed in the order to be taught)

- The scientific method and experimental design
- Use of compound microscopes and dissecting microscopes
- Plant anatomy: cells, tissues; root, stem, and leaf structure
- Angiosperm reproduction
- Plant growth and development
- Plant propagation techniques
- Properties of soils
- Greenhouse management – field trip to Red Sun Farms and VWCC greenhouse
- Field trip: warm-season grass growth and mgmt vs. cool-season grasses
- Mycorrhizal fungi and plant resource-sharing

Notes to Instructors

1. Departmental policy dictates that instructors do not allow students to keep tests.
2. A comprehensive final exam counting will be given at the end of the semester.
3. The syllabus should state what the course grade will be based on, such as tests, quizzes, a comprehensive final exam, and any other assignments made by the instructor.
4. The VWCC Biology Department uses a 10-point grading scale.
5. Comprehensive study of the listed topics is beyond the reasonable expectations of a 15-week AGR 142 course. It is up to the discretion of the instructor to choose which topics are more detailed but each topic should be adequately covered.
6. Additional topics may be covered at the instructor's discretion.