

AGRN 176 / HORT 180
PRINCIPLES OF CROP SCIENCE / PRINCIPLES OF HORTICULTURAL SCIENCE
Fall 2022

I. General Information

AGRN 176 (Principles of Crop Science) is a 4-credit hour course, and is an introduction to science-based principles underlying crop production, including: classification and use of major world crops; plant growth and development in response to environment and management; crop pests and pest protection; plant breeding and genetic improvement. 3 hrs. lect.; 2 hrs. lab. *IAI: AG 903*

HORT 180 (Principles of Horticultural Science) is a 4-credit hour course, and is an introduction to science-based principles underlying plant production, including: classification and use of food and ornamental plants; plant growth and development in response to environment and management; plant pests and pest protection; plant breeding and genetic improvement. 3 hrs lect.; 2 hrs. lab. *IAI: AG 905*

Lecture: MWF 8:00-8:50 a.m., Knoblauch 152
Lab (176): 041 - T 8:00-9:50 a.m., Knoblauch 226 or AFL-Agronomy or -Greenhouse
042 - T 1:00-2:50 p.m., Knoblauch 226 or AFL-Agronomy or -Greenhouse
Lab (180): 041 - T 10:00-11:50 a.m., Knoblauch 226 or AFL-Agronomy or -Greenhouse

Instructors:	Dr. Mark Bernards 321 Knoblauch Hall Office: 309-298-1569 Mobile: 309-313-5917 Email: ml-bernards@wiu.edu	Dr. Shelby Henning B12 Knoblauch Hall Office: N/A Mobile: 217-714-3953 s-henning@wiu.edu
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Office Hours:	M 11:00-12:50 a.m. W 12:00 p.m. -12:50 p.m. F 9:00-9:50 a.m.	M 9:00 - 10:50 a.m. W 9:00 - 9:50 a.m. F 9:00 - 9:50 a.m.
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Required Texts:

McMahon MJ. 2020. Plant Science. Growth, Development, and Utilization of Cultivated Plants. Sixth Edition. Pearson, Hoboken, NJ.

Reference Texts:

Gerber C, Smith KL. 2014. Corn & Soybean Field Guide. Purdue University Agricultural Communications, West Lafayette, IN

Nafziger E. (Editor). 2009. Illinois Agronomy Handbook, 24th edition. University of Illinois Extension C1394. Available for download at <http://extension.cropsci.illinois.edu/handbook>

Sheaffer CC, Moncada KM. 2012. Introduction to Agronomy – Food, Crops and Environment, 2nd ed. Delmar, Clifton Park, NY.

Stoller P. 2006. Crop Sciences Laboratory Manual. ITCS Instructional Materials, University of Illinois, Champaign, Illinois.

Other readings will be made available from the professor, through Western Online, or the Internet.

II. University Policies

Student rights and responsibilities: A complete description is available at www.wiu.edu/provost/students.

Disruptive Student Policy: Students who interfere with normal class function or the ability of other

students to learn may be asked to leave the class for the day. For repeated offenses, a student may be removed from the course. Details may be found at: <http://www.wiu.edu/vpas/policies/disrupst.php>

Academic Integrity: <http://www.wiu.edu/policies/acintegrity.php> Western Illinois University, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. . . It is the student's responsibility to be informed and to abide by all University regulations and policies on Academic Integrity. Plagiarism, cheating, and other forms of academic dishonesty constitute a serious violation of University conduct regulations. Students who engage in dishonesty in any form shall be charged with academic dishonesty. . . Any student, faculty member, or staff person who has witnessed an apparent act of student academic dishonesty, or has information that reasonably leads to the conclusion that such an act has occurred or has been attempted, has an ethical responsibility for reporting said act(s).

The policy for AGRN 176 / HORT 180: Any confirmed act of academic dishonesty (especially plagiarism, cheating, copying another person's assignment or allowing another person to copy yours) will result in the loss of all points associated with that assignment, and may result in an "F" for the course.

Equal Opportunity: <http://www.wiu.edu/policies/affirmact.php> Western Illinois University complies fully with all applicable federal and state nondiscrimination laws, orders, and regulations. The University is committed to providing equal opportunity and an educational and work environment for its students, faculty, and staff that is free from discrimination based on sex, race, color, sexual orientation, gender identity and gender expression, religion, age, marital status, national origin, disability, or veteran status.

Sex-Discrimination and Misconduct: University values, Title IX, and other federal and state laws prohibit sex discrimination, including sexual assault/misconduct, dating/domestic violence, and stalking. If you, or someone you know, has been the victim of any of these offenses, we encourage you to report this to the Title IX Coordinator at 309-298-1977 or anonymously online at: http://www.wiu.edu/equal_opportunity_and_access/request_form/index.php. If you disclose an incident to a faculty member, the faculty member must notify the Title IX Coordinator. The complete Title IX policy is available at: <http://www.wiu.edu/vpas/policies/titleIX.php>

Disabilities: Students with disabilities: In accordance with University values and disability law, students with disabilities may request academic accommodations where there are aspects of a course that result in barriers to inclusion or accurate assessment of achievement. To file an official request for disability-related accommodations, please contact the Disability Resource Center at 309-298-2512, disability@wiu.edu or in 143 Memorial Hall. Please notify the instructor as soon as possible to ensure that this course is accessible to you in a timely manner.

Education Majors: The Illinois State Teaching license requires all education majors to receive a grade of a "C-" or better in this course in order to meet its requirements.

University Covid-19 Policies:

- Masks will not be required nor discouraged in class.
- Please avail yourself of the opportunity to test regularly
- If you feel ill, please get tested, stay home, and let your instructor know.

III. Course Expectations and Policies

1. Live the Golden Rule. Treat others with respect and courtesy in your conversation and actions. Wear your face mask properly (covering mouth and nose). Turn off and put away electronic devices (smart watches, phones, tablet computers, laptop computers, etc.) when you are in class or lab, unless directed to use them for class activities. Inappropriate use of an electronic device will result in loss of participation points for that day. If for any reason a class session is held via Zoom, please mute your microphone unless asking a question or making a comment. We have observed better performance on course assessments when you participate with your camera on and remain engaged in the class.
2. Show up. Attendance and punctuality is expected. Notify the instructor in advance if you have any

reason to miss a class period through the O.A.R.S system (<http://wiu.edu/oars>). A minimum of 24 h notice (email or phone) is required if there is any cause to miss a quiz or exam. If you do miss a class, do not ask the instructor "Did I miss anything important?" It is your responsibility to arrange to get the information you missed and to make up any missed assignments.

3. Participate. Be prepared for class discussions by completing readings, answering questions, taking notes, asking questions, and working effectively with other students on lecture and laboratory activities.
4. Study. You should plan to spend 7 hours outside of class each week to master the material. Reading assignments relating to each lecture/lab will be particularly beneficial.
5. Complete assignments. Assignments not turned in on the assigned date may have 10% of the total potential points deducted for each day after the due date. The instructor will generally return exams and assignments within 1 week.
6. The use of tobacco is prohibited in Knoblauch Hall, nor is it allowed during sessions at the AFL.
7. Students must wear sturdy, close-toed to participate in lab sessions at the AFL. Wearing long pants is highly recommended. Be prepared for the weather as portions of labs will be held outside.

IV. Course Objectives

Foundational Knowledge

1. Remember basic terminology from the following categories:
 - a. Plant classification
 - b. Plant structure
 - c. Plant life cycle, growth and development
 - d. Plant photosynthesis and respiration
 - e. Plant reproduction
 - f. Weed, disease and insect management
 - g. Soil components and management
2. Identify a wide variety of plant species from seed and plant structures
3. Define growth and development and correctly identify the growth stage of economically important plant species
4. Identify important weed, disease and insect pests

Application

5. Demonstrate your ability to write a hypothesis and correctly interpret the results of an experiment
6. Classify plants based on taxonomy, life cycle, growth characteristics and use
7. Complete basic calculations important to crop management (e.g., seeding rates, plant populations, growing degree days, nutrient removal rates, fertilizer and pesticide application, yield estimates [176], and grain moisture adjustments [176]).
8. Determine grain or vegetable quality from a variety of samples.
9. Use third-party variety testing resources to select desirable varieties.

Integration

10. Explain the importance of light, water, CO₂, plant hormones and essential plant nutrients to normal plant growth and function, and describe how plants respond to deficiencies of these resources
11. Explain how different management practices (landscape design, variety selection, soil management, water management, planting, pest management, crop rotation, harvest, storage, etc.) affect productivity and profitability
12. Explain how plant breeding, genetic modification, and vegetative propagation techniques are used to improve plant productivity and utility.

Human Dimension

13. Explain how plant domestication benefited humanity
14. Be able to educate others about the revolutionary changes in plant management over the past 200 years and challenges and opportunities pertaining to plant production in the next 20 years

Caring

15. Appreciate the diversity and adaptability of plants and their importance in our personal lives and society
16. Value the importance of the scientific method in advancing plant management practices

Learning How to Learn

17. Comprehend assigned reading materials
18. Identify reliable resources for future learning about plant science and management

V. Grading Components and Scale

The Gradebook will be available at Western Online. It will be set so you can see your current grade throughout the semester.

<u>Probable Grade components</u>	<u>Portion</u>
Participation/Attendance	10%
Lab & Homework Assignments	30%
Lab quizzes	15%
Lecture Quizzes & Final Exam	45%

Grading Scale

<u>Percentage</u>	<u>Grade</u>	<u>Percentage</u>	<u>Grade</u>
93.0-100	A	73.0-76.9	C
90.0-92.9	A-	70.0-72.9	C-
87.0-89.9	B+	67.0-69.9	D+
83.0-86.9	B	63.0-66.9	D
80.0-82.9	B-	60.0-62.9	D-
77.0-79.9	C+	<59.9	F

**We reserve the right to adjust the weight of the grade components (this will be announced in class or at Western Online) and to make adjustments to the grading scale downward (e.g., an "A" may begin at 92.5 instead of 93.0), depending upon the general performance of the class.*

VI. Assessment Metrics

Participation/Attendance: You are expected to come to lab and class and participate in discussions and activities, unless you have made prior arrangements with your instructor. Lack of preparedness and/or participation will result in a loss of 2% of the final grade. Each student will be allowed 3 "vacation" days (for funerals, interviews, oversleeping, etc). "Vacation" absences that exceed "3" will result in the lowering of the grade 2 percentage points per absence (up to 8% of the final grade). Absence for WIU-sanctioned activities (such as livestock judging competitions, professional conferences or intercollegiate athletics) will not count against "vacation" days. Absence due to illness will be evaluated on a case-by-case basis and where they are legitimate and appropriately reported they will not count against the vacation days. Repeated tardiness will result in a reduction in Participation/Attendance points. Students who accumulate more than 10 unexcused absences will receive a failing grade for the course.

Laboratory Quizzes: There will be a quiz (generally worth 10 points) associated with each laboratory period over material covered in the previous lab assignment(s) and the reading assignment for the current laboratory.

Assignments: There will be an assignment/activity each laboratory period, and many in-class activities and homework assignments to help you better learn the material. Participation points will be given for many lab assignments (unless students are not engaged in lab activities, in which case the assignments will be collected). Collected assignments will be graded on accurate completion. Brief reading comprehension quizzes may be given occasionally in lecture or through Western Online.

Lecture Quizzes and Final Exam: A quiz (generally worth 150 points) will be given approximately every third week. The purpose of frequent quizzes is to help you keep current with the material. The comprehensive final exam (approximately 400 points and 16% of your total grade) will assess your mastery of the course objectives, and will include material covered in lecture and laboratory.

Extra Credit: Extra Credit will also be available for participating in the School of Ag Career Fair (Oct 5) and the School of Agriculture Alumni panel (Sept 22). To obtain points you will need to write a 1-page summary (your experience and what you learned) at each event.

VII. Probable Course Calendar

Date	Topic	Homework or Assignment
Aug 22	Introduction: Plants are Amazing	Syllabus, pp 1-12, Radiolab
Aug 23	176: Crop seed ID and planting 180: Crop seed ID and planting	Syllabus quiz
Aug 24	Scientific Method and Hypothesis Writing, Radiolab discussion	Hypothesis writing handout
Aug 26	Scientific Method and Hypothesis Writing review, Data Analysis and Interpretation, 1	Data analysis handout
Aug 29	Data Analysis and Interpretation, 2	
Aug 30	<u>Crop Seed ID Quiz</u> 176: Agronomic Research 180: Horticultural Research	pp. 12-17
Aug 31	Structure and Function of Plant Organs & Cells	pp. 86-117
Sep 2	Structure and Function of Plant Organs & Cells	pp. 86-117
Sep 5	<i>Labor Day, no class</i>	
Sep 6	176 / 180: Plant morphology identification	
Sep 7	Structure and Function of Plant Organs & Cells	pp. 86-117
Sep 9	<i>Quiz 1</i>	
Sep 12	<i>Review Quiz 1. Plant Growth and Development and Systems for Identifying Plant Growth Stage</i>	pp. 119-144, handout
Sep 13	<u>Plant morphology identification quiz</u> 176: Soy & corn growth & development 180: Identifying plant growth stage	176: C&S FG pp. 20-40, C&S FG pp. 120-127
Sep 14	Light and Development	pp. 50-52, 127-138, 367-368
Sep 16	Temperature and Development	pp. 58-62, 136-144, 367, 391
Sep 19	Plant Growth Regulators and Development	pp. 144-153, 136
Sep 20	176 / 180: Weed, Disease, Insect Pest identification	
Sep 21	Weeds	pp. 320-331
Sep 23	Insects	pp. 332-342
Sep 26	Diseases	pp. 342-354
Sep 27	<u>Weed, Disease, and Insect ID Quiz</u> 176: Planting and planters, certified seed, seed tags, seeding rates, plant patents 180: Planting and transplanting, certified seed, seed tags, seeding rates, plant patents	pp 179-182, 393-396
Sep 28	Seed Laws, Seed Viability and Seeding Rates	pp. 179-182, 394-395
Sep 30	<i>Quiz 2</i>	

Oct 3	<i>Review Quiz 2. Scouting, Troubleshooting and Pesticides</i>	pp. 354-358, 396-399 supplemental reading
Oct 4	176 / 180: Scouting, Troubleshooting & Pesticide calculations	Pesticide calculation and label assignment
Oct 5	IPM	pp. 314-320
Oct 7	Plant Domestication and Centers of Origin	pp. 220-235
Oct 10	Plant Nomenclature, Taxonomy & Classification	pp. 210-220, 36-47, 129-133
Oct 11	176 / 180: Identifying and Classifying Crop Plants (AFL)	Plant classification terms handout, Crop report assignment
Oct 12	Climate and Evapotranspiration	pp. 24-30, 49-66, 262-266
Oct 14	Fall Break! No Class	
Oct 17	Soil Water Availability and Management	pp. 53-57, 257-266, 297-305
Oct 18	<u>Crop Plant and Seed ID Quiz</u> 176: Corn & Soy Yield estimates 180: Yield estimates for vegetables	Yield estimates assignment
Oct 19	Landscape Design and Ecological Function	pp. 19-24, 31-33, 669-684, 630-666
Oct 21	<i>Quiz 3</i>	
Oct 24	<i>Review Quiz 3. Harvest</i>	pp. 368-371
Oct 25	176: Harvest, Harvest Losses & Grain Moisture; Soil Residue Cover Measurements 180: Harvest, Harvest Losses; Soil Residue Cover Measurements	Harvest and storage calculations assignment
Oct 26	Photosynthesis	pp. 239-251
Oct 28	Respiration, Plant Chemistry, Nutrition	pp. 251-254, 156-167, 36-41, supplemental reading
Oct 31	Processing, Storage & Food Security	pp. 368-380, supplemental reading
Nov 1	176: Grain Quality & Grading 180: USDA Grading of Vegetable Crops (Field trip to HyVee)	pp. 368-380, 180-181
Nov 2	Genetics, Plant Breeding & Biotechnology	pp. 169-180, 223-236
Nov 4	Genetics, Plant Breeding & Biotechnology	pp. 169-180, 223-236
Nov 7	Vegetative Reproduction	pp. 184-204, 223
Nov 8	No Lab! Election Day! Go Vote! 176 / 180: Variety Selection (self-guided assignment)	pp. 391-393
Nov 9	Global production, use, distribution of horticultural crops	pp. 444-518
Nov 11	<i>Quiz 4.</i>	
Nov 14	<i>Review Quiz 4. Global production, use, distribution of grains, fiber, forage crops</i>	pp. 389-441
Nov 15	176 / 180: Seed Anatomy, Germination and Emergence (KH 226)	pp. 180-184
Nov 16	Global production, use, distribution of grains, fiber, forage crops	pp. 389-441
Nov 18	Cropping Systems & Marketing	pp. 19-34, 362-366, 380-385, 366-367, 389-390
Nov 21-25	<i>Thanksgiving Break</i>	
Nov 28	Introduction to Soils	pp. 69-83
Nov 29	<u>Seed and Seedling structure ID quiz</u> 176 / 180: Soil properties (KH 226) Course Evaluation	pp. 69-83, Soil Survey Assignment
Nov 30	Tillage, Soil Seedbed & Soil Health	pp. 284-297, posted reading
Dec 2	Essential Nutrients for Plants	pp. 268-280

Dec 5	Factors Influencing Plant Nutrient Availability and Precision Agriculture	pp. 75-83, 262-265, 268-280, 297-299, 305-309,
Dec 6	176 / 180: Soil Fertility and Fertilizers (KH 226)	pp. 264, 305-310, 615-617
Dec 7	Introduction to Hydroponics	pp. 590-594
Dec 9	History and Future of Plant Production	pp. 2-11
Dec 12	<i>Final Exam, 8-10 a.m.</i>	