

# Course Syllabus

## **HORT/CROP\_SCI 202**

### Crop Growth & Development

**4 credits**

#### **Goal**

Students will be provided with knowledge on basic scientific principles of crop growth and development, including external abiotic influences (light, temperature, water, and nutrients) and their interaction with internal influences (genes, proteins, and hormones) from the cellular to the whole plant level. Consideration of how the application of such scientific knowledge has and can lead to crop improvement for efficient and sustainable crop production will be emphasized. Skills in quantitative reasoning, scientific teamwork, and research communication (written, visual, and oral) will be introduced and fostered. Students will be exposed to the diversity of WSU faculty programs in crop growth, development, and improvement. This course will facilitate student appreciation of and access to knowledge sources for crop growth and development principles and practice.

#### **Student Learning Outcomes**

Through engagement in class and lab activities, students will:

1. Apply basic scientific principles of how plants grow and develop to understanding crop quality and yield.
2. Evaluate how scientific knowledge enables improved crop production.
3. Investigate areas of interest in crop growth and development for crop improvement, integrating knowledge sources and demonstrating skills in quantitative reasoning, research communication, and teamwork.

#### **Instructors**

Dr. Cameron Peace, [cpeace@wsu.edu](mailto:cpeace@wsu.edu)

Dr. Jacob Blauer, [jblauer@wsu.edu](mailto:jblauer@wsu.edu)

Pullman Lab Teaching Assistant: Olufunke Ogundiya, [olufunke.ogundiya@wsu.edu](mailto:olufunke.ogundiya@wsu.edu)

Everett Lab Teaching Assistant: Jordan White, [jordan.a.white@wsu.edu](mailto:jordan.a.white@wsu.edu)

*Office hours for all: By appointment*

### **Class times**

Lecture: MWF 9:10–10:00 am, TDAD 276 (Pullman) and EVRT 458 (Everett)

Lab Pullman: Mon 2:10 - 5:00 pm or Tues 1:30 - 4:10 pm, VPBS 35

Lab Everett: Mon 2:30 - 5:20, EVCC SHUKSAN HALL (SHK)134

### **Prerequisite course**

HORT/CROP\_SCI 102

### **Recommended text book**

Plant Science: Growth, Development, and Utilization of Cultivated Plants. 6th edition. Margaret J. McMahon. Pearson Publishing.

### **Expectations for student effort**

Students are expected to attend class and labs in person and complete all assessment (below). You should invest at least 6 hours per week outside of class time (such as in preparation for the next class, completing assignments, taking advantage of additional learning resources provided, and working on Group Project components, and studying for exams). This minimum time investment is important to sufficiently engage with the course's content. Unfortunately, any less will likely leave you with a shallow understanding of the features and principles of crop growth and development and their consequences for crop improvement.

### **Assessment**

The course's 500 points of assessment are divided into four parts:

200 pts Exams: 50 pts Exam 1 (lecture blocks I-III), 50 pts Exam 2 (lecture blocks IV-V), 100 pts Final Exam (comprehensive)

100 pts Lecture-Based Assignments: 80 pts Principles in Practice (8x 10 pts), 10 pts Interview with a

Professional, 10 pts Academic Showcase report

150 pts Lab-Based Assignments: 100 pts Group Project, 50 pts Lab Reports (10x 5 pts)

50 pts Class Attendance and Participation: 1-10 pts of miscellaneous assignments originating in class

### Late Assignments

Late assignments will not be accepted unless appropriate arrangements are made with the course instructor prior to the due date. Late approvals will not be issued except in extenuating circumstances, in accordance with university standards.

### Grading Scale

Final grades will be based on proportion of the course's 500 points earned:

100-94%	A	76-74%	C
93-90%	A-	73-70%	C-
89-87%	B+	69-67%	D+
86-84%	B	66-64%	D
83-80%	B-	64-60%	D-
79-77%	C+	<59%	F

### LECTURE SCHEDULE

Week	Date	Lecture block
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#### BLOCK I

1	L01	Jan 6 M	Crop Improvement - Introduction
	L02	8 W	Crop Improvement - Introduction
	L03	10 F	Crop Improvement - Introduction
2	L04	13 M	Crop Improvement - Introduction

#### BLOCK II

	L05	15 W	Patterns of Plant Growth & Development
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L06 17 F Patterns of Plant Growth & Development  
3 20 M *University Holiday (Martin Luther King Jr. Day)*

L07 22 W Patterns of Plant Growth & Development

L08 24 F Patterns of Plant Growth & Development

**BLOCK III**

4 L09 27 M Plant Structure & Function

L10 29 W Plant Structure & Function

L11 31 F Plant Structure & Function

5 L12 Feb 03 M Plant Structure & Function

L13 05 W Plant Structure & Function

L14 07 F Plant Structure & Function

6 10 M **Exam 1** (50 min)

L15 12 W Exam Review

**BLOCK IV**

L16 14 F Internal Mechanisms

7 17 M *Class Holiday (Presidents' Day)*

L17 19 W Internal Mechanisms

L18 21 F Internal Mechanisms

**BLOCK V**

8 L19 24 M External Influences

L20 26 W External Influences

L21 28 F External Influences

9 L22 Mar 03 M External Influences

L23 05 W External Influences

L24 07 F External Influences

10-14 *Spring Break*

<b>10</b>	L25	17 M	External Influences
	L26	19 W	External Influences
	L27	21 F	External Influences
<b>11</b>	L28	24 M	External Influences
		26 W	<b>Exam 2</b> (50 min)
	L29	28 F	Exam Review

### **BLOCK VI**

<b>12</b>	L30	31 M	Crop Propagation
	L31	Apr 02 W	Crop Propagation
	L32	04 F	Crop Propagation
<b>13</b>	L33	07 M	Crop Propagation

### **BLOCK VII**

	L34	09 W	Genetic Diversity & Breeding
	L35	11 F	Genetic Diversity & Breeding
<b>14</b>	L36	14 M	Genetic Diversity & Breeding
	L37	16 W	Genetic Diversity & Breeding

### **BLOCK VIII**

		18 F	Group Project Presentations – PHS at 8:30 am
<b>15</b>		21 M	Group Project Presentations – PHS at 9:00 am
		22 W	Review for Final Exam
		25 F	Review for Final Exam

**Finals Week**

**Thu 1st May**

**Final Exam** (2 hrs 50 min, 7:10 – 10:00 am)

**LECTURE TOPICS/READINGS**

Lecture block	Textbook chapter	Lecture topics
I Crop Improvement – Introduction	1, 2, 3	Course outline and assessment, crop domestication, production trends, why improve crops?
II Patterns of Plant Growth & Development	7 - specifically: p119 <i>Definitions and Measurements,</i> pp127-133 <i>Stages,</i> pp134-144 <i>Reproductive Growth and Development</i>	Growth patterns, phase changes, annuals, biennials, perennials, harvest index, flower, fruit, and seed growth and development patterns
III Plant Structure & Function	6, 8	Plant chemicals, cell components, permanent tissues, meristems, seeds, roots, stems, buds, leaves, flowers, fruit
IV Internal Physiological Mechanisms	11, (7, 8)	Photosynthesis, respiration, plant hormones
V External Influences	4, 5, 12, 13, (14, 15, 16)	Perception of external stimuli Light, temperature, water, nutrients, biotic factors, inputs & management
VI Crop Propagation	9	Mitosis, meiosis, inheritance, pollination, fertilization, seed propagation, vegetative propagation
VII Genetic Diversity & Breeding	9, 10, (17-26)	Genetic diversity, breeding, integration of cultural

practices and genetic techniques for crop improvement

VIII Crop Improvement – Advanced na

Group Project poster presentations, course wrap-up

### **Missed Exam Policy**

Exams cannot be made up if missed unless a legitimate reason (see Attendance Policy above) is provided in advance.

### **Attendance Policy**

Any conflict arising with absence will be addressed with the course instructor, the Office of the Dean of Students, and/or the Office of Civil Rights Compliance and Investigation on a student's behalf when the student's involvement in a matter implicating the WSU Policy Prohibiting Discrimination, Sexual Harassment, and Sexual Misconduct, Executive Policy #15 is having a significant impact on the student's academic progress.

### **Use of AI Policy**

For assignments, use of generative AI tools (such as ChatGPT, Grammarly, DALL-E, Midjourney) for text or images is permitted in this course only with prior permission and with acknowledgment. If used, remember that it is a support tool and NOT a replacement for original effort. Consider the output of an AI tool to be just a draft or suggestion, and make sure you are subsequently the final editor. You are recommended not to rely on AI edits, as AI can readily make factual mistakes as well as logical mistakes by twisting the meaning of sourced information. And plagiarism and privacy risks exist in its use.

If you are thinking that generative AI could help with an assignment, follow these steps:

1. Check with your instructors via email (i.e., in writing) to obtain prior permission – this will help avoid situations where its use is inappropriate.
2. Then if you do use AI to generate or edit text or images towards the final submitted product of an assignment, disclose its use: Include a statement near the start of the submitted work that discloses the platform(s) and the way it was used (e.g., "AI (program: XYZ) was used to seek

suitable scientific literature / summarize sourced information / generate the initial ideas / draft the text / edit my text for improved style”). If it is an image, attribute the AI program as the source of the image, just as you would for any image used that was generated by someone else.

## COVID-19 Statement

We anticipate that there will be students who test positive for COVID-19 during the 2024-2025 academic year and will need to follow local and state public health policies and guidance. Students are expected to abide by all current COVID-19 related university policies and public health directives, which could include wearing a cloth face covering, physically distancing, self-attestations, and sanitizing common use spaces. All current COVID-19 related university policies and public health directives are located at <https://wsu.edu/covid-19/>. Students who do not comply with these directives may be required to leave the classroom; in egregious or repetitive cases, students may be referred to the Center for Community **Standards for university disciplinary action**.

## Academic Integrity Statement

You are responsible for reading WSU’s [Academic Integrity Policy](https://communitystandards.wsu.edu/policies-and-reporting/academic-integrity-policy/), which is based on [Washington State law](https://apps.leg.wa.gov/wac/default.aspx?cite=504-26-202). If you cheat in your work in this class you will:

- Fail the course.
- Be reported to the [Center for Community Standards](https://communitystandards.wsu.edu/).
- Have the right to appeal your instructors’ decision.
- Not be able to drop the course or withdraw from the course until the **appeals** process is finished.

If you have any questions about what you can and cannot do in this course, ask your instructor.

If you want to ask for a change in my decision about academic integrity, use [the form](https://cm.maxient.com/reportingform.php?WashingtonStateUniv&layout_id=10) at the [Center for Community Standards](https://communitystandards.wsu.edu/) website. You must submit this request within 21 calendar days of the decision.

## University Syllabus

Students are responsible for reading and understanding all university-wide policies and resources pertaining to all courses (for instance: accommodations, crisis resources, policies on discrimination or harassment), which can be found in the university syllabus:

## **Reasonable Accommodation Statement**

Students with Disabilities: Reasonable accommodations are available for students with documented disabilities or chronic medical or psychological conditions. If you have a disability and need accommodations to fully participate in this class, please visit your campus' Access Center/Services website to follow published procedures to request accommodations. Students may also contact their campus offices to schedule an appointment with a Disability Specialist. All disability related accommodations are to be approved through the Access Center/Services on your campus. It is a university expectation that students visit with instructors (via email, Zoom, or in person) to discuss logistics within two weeks after they have officially requested their accommodations.

For more information contact a Disability Specialist on your home campus:

- Pullman, WSU Global Campus, Everett, Bremerton, and Puyallup: 509-335-3417 Access Center (<https://www.accesscenter.wsu.edu>) or email at [access.center@wsu.edu](mailto:access.center@wsu.edu)
- Spokane: Access Services (<https://spokane.wsu.edu/studentaffairs/access-resources/>) or email [spokane.access@wsu.edu](mailto:spokane.access@wsu.edu)
- Tri-Cities: Access Services (<http://www.tricity.wsu.edu/disability/>) or email [tricitie.AccessServices@wsu.edu](mailto:tricitie.AccessServices@wsu.edu)
- Vancouver: 360-546-9739 Access Center (<https://studentaffairs.vancouver.wsu.edu/access-center>) or email [van.access.center@wsu.edu](mailto:van.access.center@wsu.edu)

## **Accommodation of Religious Observance**

Washington State University reasonably accommodates absences allowing for students to take holidays for reasons of faith or conscience or organized activities conducted under the auspices of a religious denomination, church, or religious organization. Reasonable accommodation requires the student to coordinate with the instructor on scheduling examinations or other activities necessary for course completion. Students requesting accommodation must provide written notification within the first two weeks of the beginning of the course and include specific dates for absences. Approved accommodations for absences will not adversely impact student grades. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who feel they have been treated unfairly in terms of this accommodation may refer to Academic Regulation 104 - Academic Complaint Procedures. See also Rule 82, available at <https://registrar.wsu.edu/academic-regulations/>.

Any student seeking reasonable accommodations under this section must provide written notice to

the instructor, within the first two weeks of the beginning of the course and include the specific dates for absences. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence.

- The instructor shall inform the student of the decision in writing within seven calendar days of the receipt of the request.
- Approved accommodations for absences will not adversely impact student grades.
- The university provides notice to students of this policy on the university's web site and in course or program syllabi, including grievance procedures.

Any student who believes that she or he has not been appropriately accommodated under this policy may seek review of the decision by sending a written request to the chairperson of the department offering the course, as soon as possible and no later than seven days after learning of the instructor's decision. After the chair's decision, the student or the instructor may appeal to the dean's office. Appeals to the dean's office must be presented in writing within seven calendar days of the chair's decision. The decision of the dean or associate dean shall be made within seven calendar days and is final. The University Ombudsman is available at any stage for advice or assistance in resolving requests for accommodation. Students should understand that fairness in the examination process is an important consideration in the educational process and that they do have a duty to cooperate in making alternate arrangements.

## **Severe Weather Policy**

When appropriate campus authorities declare a "Yellow / Delayed or Limited Operations" or "Red / Closed" campus condition (BPPM 50.40-46), or travel to instructional locations is unsafe, classes may be cancelled or delayed. When a student does not attend due to adverse conditions, the instructor will not penalize the student. See the Inclement Weather Policy online at each campus website and at the Office of the Provost website.

For severe weather alerts, see: <http://alert.wsu.edu/> and <https://oem.wsu.edu/emergency-procedures/severe-weather/>. In the event of severe weather affecting university operations, guidance will be issued through the alert system.

## **SAFETY AND EMERGENCY NOTIFICATION – SHORT FORM**

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI's Run, Hide, Fight video and visit the classroom safety page <https://provost.wsu.edu/classroom-safety/>.

## **SAFETY AND EMERGENCY NOTIFICATION – LONG FORM**

Classroom and campus safety are of paramount importance at Washington State University and are the shared responsibility of the entire campus population. WSU urges students to follow the “Alert, Assess, Act,” protocol for all types of emergencies and the “Run, Hide, Fight” response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI’s Run, Hide, Fight video and visit the WSU safety portal.

Full details can be found at <https://provost.wsu.edu/classroom-safety/>

## **DISCRIMINATION AND HARRASSMENT POLICY STATEMENT**

Discrimination, including discriminatory harassment, sexual harassment, and sexual misconduct (including stalking, intimate partner violence, and sexual violence) is prohibited at WSU (See WSU Policy Prohibiting Discrimination and Harassment (Executive Policy 15) and Standards of Conduct for Students (WAC Code 504-26) ).

If you feel you have experienced or have witnessed discriminatory conduct, you can contact the WSU Office of Civil Rights Compliance & Investigation (CRCI) and/or the WSU Title IX Coordinator (see [crciwsu.edu/title-ix/](http://crciwsu.edu/title-ix/) ) at 509-335-8288 to discuss resources, including confidential resources, and reporting options. (Visit <https://ccr.wsu.edu> for more information).

Most WSU employees, including faculty, who have information regarding sexual harassment or sexual misconduct are required to report the information to CCR or a designated Title IX Coordinator or Liaison. Visit <https://ccr.wsu.edu/file-a-complaint/> for more information.

## **LAUREN’S PROMISE – I WILL LISTEN AND BELIEVE YOU IF SOMEONE IS THREATENING YOU.**

Lauren McCluskey, a 21-year-old honors student athlete, was murdered on October 22, 2018, on the University of Utah campus by a man she briefly dated. We must all take actions to ensure that this never happens again.

## **University Support and Response for Discrimination and Harassment**

Discrimination, discriminatory harassment, sexual harassment, and sexual misconduct (including stalking, intimate partner violence, and sexual violence) are prohibited at WSU (see Executive Policy 15 - WSU Policy Prohibiting Discrimination and Harassment, the WSU Standards of Conduct for Students, and relevant employee manuals). WSU has instituted procedures to respond to violations of these laws and standards, programs aimed at the prevention of such conduct, and intervention on behalf of victims.

If you are in immediate danger, call 911.

If you are experiencing sexual assault, domestic violence, stalking, discrimination or harassment, you have support and options. If you share information with me, please know that I am required to reach out to the Title IX Coordinator in WSU Compliance and Civil Rights (CCR), and CCR will reach out to you with information about on and off campus reporting options and resources. CCR is a system-wide resource (all campuses) which is available for intake consultations for you to learn more about available support. You can reach them directly at 509-335-8288, [ccr@wsu.edu](mailto:ccr@wsu.edu), or report online (anonymous reports accepted).

You can also speak to a victim advocate, a medical provider, or counselor confidentially about your concerns. Advocates help survivors of crime determine their own needs in regards to their physical and emotional health, reporting options, and academic concerns. At no cost, advocates connect survivors to campus and community services, and provide accompaniment to important appointments (court, hospital, and police) and support throughout the process. For a list of confidential victim advocates and medical providers, please visit CCR Resources.

WSU Police Department (WSU PD) officers and campus security will treat victims of sexual assault, domestic violence, stalking, hate crimes, and other crimes with respect and dignity. WSU PD, campus security departments, CCR, and victim advocates can also help you with safety planning.

## **STUDENTS IN CRISIS – PULLMAN RESOURCES**

If you or someone you know is in immediate danger, DIAL 911 FIRST!

Student Care Network: <https://studentcare.wsu.edu/>

Cougar Transit: 978 267-7233

WSU Counseling and Psychological Services (CAPS): 509 335-2159

Suicide Prevention Hotline: 800 273-8255

Crisis Text Line: Text HOME to 741741

WSU Police: 509 335-8548

Pullman Police (Non-Emergency): 509 332-2521

WSU Office of Civil Rights Compliance & Investigation: 509 335-8288

Alternatives to Violence on the Palouse: 877 334-2887

Pullman 24-Hour Crisis Line: 509 334-1133

## **University Syllabus**

Students are responsible for reading and understanding all university-wide policies and resources pertaining to all courses (for instance: accommodations, crisis resources, policies on discrimination or harassment), which can be found in the university syllabus:

<https://syllabus.wsu.edu/university-syllabus>  (<https://syllabus.wsu.edu/university-syllabus>)