ORIGINAL COURSE IMPLEMENTATION DATE:	January 2009
REVISED COURSE IMPLEMENTATION DATE:	January 2024
COURSE TO BE REVIEWED (six years after UEC approval)**:**	April 2029

Course outline form version: 09/08/2021

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: AGRI 324	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Protected Crop Production: Science and Practice **Course Short Title:** Protected Crop Production	
Faculty: Faculty of Science	**Department (or program if no department):** Agriculture Technology

Calendar Description:

Technical aspects of the design, operation, environmental control, monitoring, and irrigation systems design of greenhouse and other protected crop systems (e.g. vertical farming and mushroom). Production requirements of crops from variety to selection to post-harvest handling are explored. This course combines theory with hands-on practice in on-campus greenhouses and other growing facilities.

Note: Field trips outside of class time will be required. Please check with the department for details.

Prerequisites (or NONE):	None.
Corequisites (if applicable, or NONE):	None.
Pre/corequisites (if applicable, or NONE):	AGRI 124 and AGRI 129.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number: **AGRI 224**

Cross-listed with:

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar	30
Experiential (work-integrated learning)	12
Experiential (field trip)	3
Total hours	**45**

Scheduled Laboratory Hours

Labs to be scheduled independent of lecture hours: ☒ No ☐ Yes

Course Details

Special Topics course: **No**

(If yes, the course will be offered under different letter designations representing different topics.)

Directed Study course: **No**

(See policy 207 for more information.)

Grading System: **Letter grades**

Delivery Mode: **Face-to-face only**

Expected frequency: **Annually**

Maximum enrolment (for information only)**: 25**

Prior Learning Assessment and Recognition (PLAR)

PLAR is available for this course.

Transfer Credit *(See **bctransferguide.ca**.)*

Transfer credit already exists: **Yes**

Submit outline for (re)articulation: **Yes**

(If yes, fill in transfer credit form.)

Department approval	**Date of meeting:**	November 2022
Faculty Council approval	**Date of meeting:**	December 2, 2022
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	April 21, 2022

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

Upon successful completion of this course, students will be able to:

1. Explain critical aspects in the design of controlled environment systems for plant production.
2. Explain the impact of environmental factors (specifically water, nutrient, and CO2) on plant growth in protected systems (e.g., greenhouse or vertical production).
3. Analyze water and plant nutrients tests and develop appropriate nutrient input plans for maximum growth and yield in conventional and organic systems.
4. Outline methods for manipulating greenhouse or other protected environment to control plant growth and development.
5. Create appropriate supplemental lighting strategies for maximum yield and highest energy efficiency.
6. Design and describe appropriate crop cultivation techniques.
7. Develop IPM management plan for protected environment.
8. Describe and implement requirements to successfully grow greenhouse crops of economic importance to British Columbia.
9. Describe production, challenges, and opportunities for the commercial mushroom sector.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Quizzes/tests:	40%	Final exam:	10%	Assignments:	50%
	%		%		%

Details:

Field trip assignment: 10%
Growing practices assignment: 40%

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. Open Educational Resources (OER) should be included whenever possible. If more space is required, use the Supplemental Texts and Resource Materials form.)*

	Type	Author or description	Title and publication/access details	Year
1.	Online resource		OMAFRA Publication 836, Growing Greenhouse Vegetables in Ontario. 2021 revision. http://omafra.gov.on.ca/english/crops/pub836/p836order.htm	
2.	Textbook	Hanan, Joe J.	Greenhouses: Advanced Technology for Protected Horticulture.	
3.	Textbook	Nelson, Paul V.	Greenhouse Operation and Management 7th Edition	2011
4.	Textbook	Editors: Toyoki Kozai, Genhua Niu, Joseph Masabni	Plant Factory Basics, Applications and Advances, 1st Edition	2021
5.				

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Calculator, pruners, pocketknife, work gloves, rain gearCSA (Canadian Safety Association) approved footwear, transportation to field trips.

Course Content and Topics

1. Introduction to controlled environment agriculture, statistics, and market trends
2. Structures and components
3. Plant nutrient recipes for organic and conventional production and nutrient delivery systems
4. Irrigation and the root zone environment
5. Climate control; heating, RH, CO2
6. Solar radiation, lighting systems/ spectrum
7. Production and environmental control systems
8. Biology, physiology, and production practices and major pests and diseases of leafy greens, solanaceae (tomato, bell pepper, eggplant)
9. Biology, physiology, and production practices and major pests and diseases cucurbits plants (cucumber, melons), berries in protected environment
10. Biology, physiology, and production practices and challenges of growing mushrooms