

Indoor Cultivation of High Value Crops

11:020:340

4 Credits

Format: Lecture/Lab/Online

Meetings: Tuesday 12:35-3:35 pm; Thursday 12:35-1:55 pm

Location: Floriculture Greenhouse FG-115, Red Oak Lane

Lab Location: Horticultural Research Greenhouse.

Limited to 25 Students.

Notes: Open to sophomores, juniors and seniors (24 credits) or freshman with greenhouse/farming/marketing experience by special permission. Introduction to Horticulture (11:776:211) recommended but not required.

CONTACT INFORMATION:

Instructor(s): Bill Sciarappa (lead); AJ Both, Albert Ayeni

Guest Lecturers: Jim Simon, Robin Brumfield, Nikki Graff

Office Location: Various locations.

Phone: 732-431-7260 X7278

Email: Sciarappa@njaes.rutgers.edu

Office Hours: Before or after class

COURSE WEBSITE, RESOURCES AND MATERIALS:

- eCollege or Canvas will be used.

COURSE DESCRIPTION:

Aeroponics, hydroponics and geponics are innovative and emerging greenhouse technologies that may offer career opportunities in the production of high value crops. Students will investigate these various indoor plant growth methods in mini-models, commercial vertical towers and conventional hydroponic or geponic systems. The students will compose a detailed production, business and marketing plan. Students will be able to compare these systems in terms of research, educational demonstration and agri-business feasibility. Independently, they will master the culture of one specific crop of interest under a controlled environmental system and assess entrepreneurial potential in New Jersey as well as nationally and globally.

Hands-on Production:

Over the course of the fall 2017 semester, students will work with propagation of specialty crops transplanted into mini-aeroponic systems that they have assembled in the Floriculture Greenhouse. They will compare their systems performance to the commercial tower systems, hydroponic and geponic units in the Research Greenhouse. Nine teams of 2-3 students each will plant three replications of basil, kale and a leafy green such as Rutgers Scarlet Lettuce. They will measure and photograph root and shoot growth weekly and maintain their individual systems. Each third of the class represents three replications of one indoor aeroponic crop. These teams will work online to compile and compare their results for each individual crop. Data includes harvest wet weight, length of roots and shoots, color and plant structure. These crop growth results and demonstrations will be presented in class as a team powerpoint with detailed notes, data tables, and photos available to the entire class and faculty for future reference. They will also be exposed to more advanced training with the commercial systems conducting hands-on planting, checking greenhouse systems and maintenance.

LEARNING GOALS:

At the Conclusion of the course, the student will:

- Explain and demonstrate knowledge of practices in aeroponic, hydroponic and geponic systems

- Explain basic marketing tools used for specialty crop production
- Quantify yield and be able to project supply of produce created in each production system
- Demonstrate knowledge of basic greenhouse technology and plant growth
- Design an experiment to test production in the indoor cultivation system
- Make recommendations for crop selection via indoor cultivation systems
- Acquire competence in independent learning via web based distance education
- Learn and demonstrate creative thinking in solving agricultural and horticultural problems
- Communicate and work effectively with other classmates and colleagues

ASSIGNMENTS/RESPONSIBILITIES & ASSESSMENT:

Online assignments include:

- Video modules – 10x weekly from Horticulture Engineering Department
- Aeroponic, hydroponic and geoponic websites
- Greenhouse websites
- Video – a New England Food Vision
- Specific crop production recommendations – nutrient and pest management
- Marketing sites for agri-business including wholesale and retail prices
- Submitting an independent paper on a specific high value crop of interest.

Grading Guidelines

While the assignment of grades is ultimately the purview of the instructor, the Agriculture and Food Systems Program starting Fall 2017 uses the following guideline for understanding appropriate grading in its courses:

A – Outstanding (90-100%). –This not only means fulfilling the requirements, but impressing and going beyond the initial expectations and assigned elements of the course. The student has demonstrated a superior grasp of the subject matter coupled with a high degree of creative or logical expression, individual initiative, and a strong ability to present these ideas in an organized and analytical manner.

B – Very Good – (80-89%). The student has demonstrated a solid grasp of the material with an ability to organize and examine the material in an organized, critical, and constructive manner. The projects and in-class performance reveal a solid understanding of the techniques, issues and related theories, with some additional work completed.

C – Acceptable –(70-79%). The student has shown a moderate ability to grasp concepts and theories for the class, producing work that, while basically adequate, is not in any way exceptional. The performance in class displays a basic familiarity with the relevant literature and techniques.

D – Unacceptable – (60-69%). The work demonstrates a minimal understanding of the fundamental nature of the material or the assignment with a performance that does not adequately examine the course material critically or constructively.

F – Failure – (<60%). The student has demonstrated a lack of understanding or familiarity with course concepts and materials. Their performance has been inadequate. Failure is often the result of limited effort and poor attendance which may indicate that the student is not in the proper field of study.

ASSIGNMENTS AND ASSESSMENT	
Tests – 20% 2 on-line tests	Two online exams will be provided via eCollege and are completed within a short timeframe during the week. These questions are derived from lectures, labs, video modules and readings.
Assignments 20%	Pre and post-tests, class readings, viewing video modules, greenhouse plan & design, descriptive paper and design, submission of potential exam questions for exams.
Participation 30 %	Frequent on-line presence is required. On-line participation (total=30%) is quantitatively calculated by the time, frequency and quality a student spends on line viewing video modules. Their responses are individually recorded by the eCollege system. Their responses to educational video modules sub-total 10%, to the Threads sub-total 10% and completion of the pretest, ice breaker, webliography entries sub-total 10%. Extra credit can be obtained with involvement with horticultural/farming clubs on campus or public organizations. Write 3-5 pages on the groups' mission, what you did and what you learned including photos. Additional extra credit options may be offered as attending external seminars and events and; writing a 2-5 page paper on the presentation/subject or your thoughts after visiting a commercial greenhouse, or interning with a greenhouse grower. Extra credit = 5-10%
Final – 30%	Individual & Team Projects – Individual indoor cultivation report on high value crop (15%) and team greenhouse project powerpoint (15%).
	90+ = A 85-89= B+ 80-84 = B 75-79=C+ 70-74 = C 60-69 = D F

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

ABSENCE POLICY

Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

COURSE SCHEDULE:

Week	Instructor	Tuesday Horticulture Greenhouse
1	Bill Sciarappa	Overview, eCollege, mini-aeroponic construction
2	Nikki Graf	Greenhouse orientation, mini-system planting
3	AJ Both	Commercial systems and career opportunities
4	Albert Ayeni	Specialty crop production, progress in hot peppers
5	Bill Sciarappa	Leafy greens and herbs – specialty crop demographics
6	Vivian Quinn	On-line testing – Exam 1
7	Jim Simon	Medicinal crops and herbs (basil)

8	Bill Sciarappa	Greenhouse pest management
9	Albert Ayeni	Leafy greens and herbs – specialty crop marketing
10	Robin Brumfield	Produce packaging and storage
11	Robin Brumfield	Product marketing, pricing and sales
12	Vivian Quinn	On-line testing – Exam 2
12	Bill Sciarappa	Harvest mini systems and photo/measure growth
13	Bill Sciarappa	Student project reports and Powerpoints
14	Bill Sciarappa	Student project reports and Powerpoints

Week	Instructor	Thursday – Research Greenhouse	Video Module
1	Joe Florentine	Greenhouse orientation/safety & technology	1A & B
2	AJ Both	Heating and light	2A & B
3	AJ Both	Students assist aeroponic and hydroponic planting	3
4	Joe Florentine	Fertigation basics and water flow	4
5	RU lab asst.	Independent project work	5
6	RU lab asst.	Independent project work	6
7	Bill Sciarappa	Horticultural measurement	7
8	RU lab asst.	Assist harvest	8
9	RU lab asst.	Assist maintenance	9
10	RU lab asst.	Assist harvest	10
11	RU lab asst.	Assist maintenance	
12			
13			
14			

Video module	Module Description
1A & B	<u>Growing systems</u> <u>Horticultural Engineering Technology</u> <u>Greenhouse Safety</u> <u>Horticultural Engineering Technology</u>
2A & B	<u>Location and Structures</u> <u>Horticultural Engineering Technology</u> Assembling Aeroponic High Tower Systems
3	<u>New Opportunities And Outlook Files 2</u> <u>Horticultural Engineering Technology</u>
4	<u>Hydroponic tomato overview revised</u> <u>Horticultural Engineering Technology</u>
5	<u>Units and Terminology</u> <u>Horticultural Engineering Technology</u>
6	<u>Light intensity and Quality</u> <u>Horticultural Engineering Technology</u>
7	<u>Supplemental Lighting and Shading</u> <u>Horticultural Engineering Technology</u>
8	<u>Measuring Environmental Parameters Root Zone</u> <u>Horticultural Engineering Technology</u>
9	<u>Floriculture Intro</u> <u>Horticultural Engineering Technology</u>
10	<u>MumGrowing 2</u> <u>Horticultural Engineering Technology</u>
11	<u>How to Price Products 3</u> <u>Horticultural Engineering Technology</u>

FINAL EXAM/PAPER DATE AND TIME

Online Final exam Schedule: <http://finalexams.rutgers.edu/>
 Final assignment in lieu of final exam.

ACADEMIC INTEGRITY

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The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.

- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing. Adherence to these principles is necessary in order to ensure that
 - everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
 - all student work is fairly evaluated and no student has an inappropriate advantage over others.
 - the academic and ethical development of all students is fostered.
 - the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the

accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.