

**HOR 134 GREENHOUSE OPERATIONS**  
**Sections IN1**

**HAYWOOD CC**  
**(Distance Learning (Internet))**

**FALL 2007**  
**3 credits**

**Instructor: Buddy Tignor, Ph.D.**  
**Class Meeting Times:**  
**24/7 – You can learn all the time**

**Classroom – Online**  
**828-565-4275 Office**  
**828-627-9589 Home**

**Office Nix 1105**  
**Email: buddy.tignor@gmail.com**  
**Office Hours: M 1-5 or by appt**

**Teaching and Learning Center Hours:**

**M-Th 8:30 – 6:30, Friday until 4**

**BLDG. 300 Room 339B**

**Division of Natural Resources**  
**Horticulture Technology**

**Divisional Secretary**  
**Jenny Carver X4560**

**Security: 646-5680**  
**(on campus)**

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## **COURSE SYLLABUS**

### **COURSE DESCRIPTION**

This course covers the principles and procedures involved in the operation and maintenance of greenhouse facilities. Emphasis is placed on the operation of greenhouse systems, including the environmental control, record keeping, scheduling, and production practices. Upon completion, students should be able to demonstrate the ability to operate greenhouse systems and facilities to produce greenhouse crops. Prerequisites: None. Corequisites: None. Credit: 3 semester hours.

### **INSTRUCTIONAL MATERIALS**

- **Required Text: Greenhouse Operation & Management. 6<sup>th</sup>ed. Author: Paul V. Nelson. ISBN 0-13-010577-5**
- **USDA Greenhouse Videos, available free on the Internet**
  
- **Other Requirements**
  - Ability to use a word processing program
  - Ability to use presentation software, i.e. PowerPoint
  - Ability to work around plants in a warm environment
  - Ability to watch YouTube videos when URL delivered via e-mail
  - Basic competency in Math and English
  - Must obtain a free Google account and use it exclusively for handing in assignments.

### **COURSE COMPETENCIES**

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

1. **Develop a working knowledge of the history of the greenhouse industry.**
2. **Describe and discuss the importance of factors involved in site selection for greenhouse construction including: location, grade, climate, access to transportation arteries, access to labor, and local regulations.**
3. **Compare and contrast the pros and cons of different greenhouse framing materials.**
4. **Discuss the advantages and disadvantages different glazing materials for horticultural crop production.**
5. **Estimate the cost of greenhouse construction based on area of growing space, glazing material, heating and cooling systems and benching.**
6. **Calculate the heating requirement of a greenhouse based on structure dimensions, construction, local temperature minimums and wind velocity.**
7. **Compare and contrast unit heaters, central heating systems (boilers), and radiant heating for commercial horticulture production.**
8. **Demonstrate how selection of fuel source for heaters can impact a grower's bottom line.**
9. **Explain the differences between active and passive cooling and when it is appropriate to utilize each.**
10. **Calculate the cfm of air exchange needed to maximize the economic effectiveness of greenhouse cooling.**

11. Adjust cfm calculation based on greenhouse dimensions, light intensity, acceptable greenhouse temperature gradient, and elevation.
12. Select appropriate fan size and horsepower for fan and pad cooling and calculate the area of cooling pads needed.
13. Calculate the number of convection tubes and number and size fans needed for winter cooling.
14. Discuss basic integration strategies for heating and cooling systems.
15. Explain how proper environmental control can alleviate plant stress and even be used to manipulate plant growth and development.
16. Explain what the characteristics of an effective soilless media are.
17. Discuss the advantages of wetting agents and starter nutrients in root substrates
18. Discuss some of the environmental implications of using peat in root substrates and some of the alternatives to peat that are available including coir.
19. List the common ingredients present in nearly all commercially available root substrates
20. Discuss the importance of bulk density, pH, container capacity, critical wilting point, and CEC in choosing a root substrate.
21. Differentiate between hydroponics and aeroponics.
22. Explain how irrigation can be used to maximize horticulture and floriculture crop yield and quality.
23. List several different strategies for measuring soil water content.
24. Calculate nutrient delivery rates for specific crops based on extension recommendations.
25. Explain how to calculate the amount of fertilizer to use in a proportioner.
26. Compare and contrast the use of liquid fertilizer as compared to slow release fertilizer.
27. Discuss the advantages of using carbon dioxide fertilization for C3 crops.
28. List and describe the advantages and disadvantages of the commonly available types of supplemental lighting for commercial greenhouses.
29. Explain how temperature impacts the core plant physiological processes of photosynthesis and respiration and how greenhouse temperature regulation can be used to alter plant growth and development patterns.
30. List the uses of PGRs in a commercial greenhouse setting.
31. List the basic tenets of and IPM program and develop a basic scouting plan for crop production.
32. Describe the most common factors that lead to disease outbreaks in the greenhouse.
33. Explain some of the regional differences in greenhouse construction, production, and business models.
34. Discuss the current trends in commercial greenhouse production (both large and small).
35. Design a greenhouse from start to finish based on the needs of specific crop production plan.

#### GENERAL COMPETENCIES:

Upon course completion, students will be able to:

1. **Teamwork** – Work *with others to*:
  - analyze a situation;
  - establish priorities;
  - apply resources for solving a problem; and
  - accomplish established mission, goals, and objectives.
2. **Responsibility** - Employ individual behaviors to
  - work within established guidelines
  - support mission, goals, objectives
  - accomplish designated tasks within identified deadlines
3. **Communication** – Appropriately *exchange ideas and information in*:
  - oral formats
  - written formats
  - visual formats
4. **Problem Solving** - Identify problems & potential causes to
  - develop solutions
  - implement action plans
5. **Information Processing** - Use current technologies to
  - develop solutions

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- communicate information
- 6 Adaptability** - Employ flexible behaviors to
- adapt to changing work environments
  - foster workable interpersonal relationships
  - profit from cultural diversity

### HCC MISSION STATEMENT: ENTREPRENEURIAL SKILLS

Haywood Community College seeks to take learning beyond the classroom by encouraging individuals to develop their abilities in problem solving, leadership, critical thinking, and entrepreneurship. As a community college, Haywood endeavors to reflect state, national, and global trends in its educational programs and to serve the surrounding community by fostering economic growth in the county and region.

### COURSE DELIVERY/STRUCTURE

This course is online. Go to <http://hor134.blogspot.com> to begin your studies.

### DROPS AND WITHDRAWALS

Students must drop a course before the first day of class in order to receive a 100% refund. A 75% refund may be issued for courses dropped before the 10% date, as set forth in the Academic Calendar. After the 10% point, the instructor must sign the drop form and a W (withdrawal) grade is given for the course on the transcript; no refund is given after the 10% point. Students may not drop a course after the "last day to withdraw from a course," as set forth in the Academic Calendar. Students who cease participating after that date will receive a WF (withdrawal failing). WF grades are counted in a student's GPA.

### FINANCIAL AID ISSUES

Financial aid cannot be awarded for a course with a CE (credit by exam) or AUD (audit) grade. Students who do not participate in class before the 10% date or do not complete the HOP assignment on time in an online course will not receive financial aid for that course.

### TASK COMPLETION POLICY

**Late work is not accepted. If a situation arises that makes it impossible to turn in your assignment (instructor decides what is deemed impossible) an alternative assignment will be allowed. ALL WRITTEN ASSIGNMENTS MUST BE TURNED IN USING GOOGLE DOCUMENTS.**

### GRADING PRACTICES

Weekly Assignments (10)*	100 pts each = 1000 total points;	50% of grade
Midterm Exam	500 pts	25% of grade
Final Exam (cumulative)	500 pts	25% of grade

*\*Weekly Assignments include credit for regular communication with instructor (asking good questions is always rewarded)*

### GRADING POLICY

100	-	90%	A
89	-	80%	B
79	-	70%	C
69	-	60%	D
59	-	0%	F

### SPECIAL NOTE

**Final Exam is cumulative and challenging. If Final Exam Grade exceeds course average, Final Exam Grade will become course grade.**

Please note that grades are not mailed. You may access grades, unofficial transcripts, and schedules online by going to [www.haywood.edu](http://www.haywood.edu). Click on "**Academic Information**" and follow the "**Check Grades**" instructions.

## **ATTENDANCE POLICY**

Students who miss 20% or more of the total possible time for a course, before the "last day to withdraw from a course," as set forth in the Academic Calendar, will receive a grade of W (withdrawal) for that course. Students who fail to meet attendance requirements *after* the "last day to withdraw from a course" will receive a WF (withdrawal failing). WF grades are counted in a student's GPA.

## **ADA NOTIFICATION: ALTERNATE LEARNING STYLES/ADDITIONAL SUPPORT**

Haywood Community College is committed to providing equal educational opportunities for students with documented disabilities. The college complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 which stipulate that no student shall be denied the benefits of an education "solely by reason of a handicap." Disabilities covered by law include, but are not limited to, learning disabilities, psychological disabilities, and hearing, sight or mobility impairments.

Students who require disability services or reasonable accommodations must identify themselves as having a disability and provide current diagnostic documentation to Disability Services counselor. All information is confidential. Please contact Student Services for more information - (828) 627-4504.

## **COLLEGE RULES AND REGULATIONS**

Upon enrollment at Haywood Community College students are provided with and agree to review and abide by all rules and regulations contained in the HCC Student Handbook and the HCC Catalog. Specifically, students agree to abide by the Student Code of Conduct in the HCC Student Handbook and the Rules and Regulations of the College in the HCC Catalog. As such, students accept that violation of the drugs, alcohol or weapons policy, or the academic honesty policy may result in expulsion. Students may obtain copies of the Handbook and Catalog in Student Services or online at [www.haywood.edu](http://www.haywood.edu).

### **Class Rules and Regulation**

- **Turn off all cell phones, pagers, and other communications devices at the start of class.**
- **Respect everyone**
- **Pay attention**
- **Attend Class with an Intrinsic Interest to Learn**
- **Must use Google e-mail address for all correspondence**

### **Course Instructional Methods** (List instructional methods used in your course by deleting the irrelevant items below.)

- lecture
- discussion
- cooperative learning
- experiential learning
- inquiry-based learning
- problem-based learning
- project-based learning

### **Course Instructional Technology** (List instructional technology used in your course by deleting the irrelevant items below.)

- Access to the World Wide Web
- Blackboard supplement
- Supplemental Web site
- Instructional videos (some online)

- Instructional DVD's
- Must obtain a Google Account
- Google Applications (free word processor and spreadsheets)
- Scientific Calculator

## Convocation

Once each fall and spring term HCC holds a campus-wide convocation on an important topic. All students, faculty, and staff are required to attend. Prior notice of dates, times, and places are provided well in advance of these events. Class times are altered to allow for student attendance. Please see your instructor for event specifics.

## Inclement Weather/ Delayed Class Schedule

When HCC is operating on the delayed schedule, classes begin at 10 a.m. The College will close when driving is hazardous; announcements are made on local TV and radio stations. Announcements for day classes are made by 6 a.m. and for night classes by 3 p.m. Commuters should exercise personal judgment concerning highway conditions regardless of College announcements, particularly those commuting from other counties or remote areas.

Classes that do not begin on the hour should meet 40 minutes for each hour scheduled with a 5-minute break between hours. Example: If a class meets regularly on Tuesday and Thursday from 8:30 a.m. – 10:45 a.m. On the delayed schedule the class would begin at 10:00 a.m. and end at 10:40 a.m. with a 5-minute break after every 40 minutes.

## ACADEMIC HONESTY

Students may not engage in academic dishonesty. The HCC Student Handbook defines Academic Dishonesty as "Taking or acquiring possession of any academic material (test information, research papers, notes, etc.) from a member of the college staff or student body without permission; receiving or giving help during tests; submitting papers or reports (that are supposed to be original work) that are not entirely the student's own; not giving credit for others' work (plagiarism)" (*Student Handbook 05-06*). Students who violate the Academic Integrity Policy will be sent to the Vice President of Student Services for expulsion from the College or other sanction.

- **Cheating:** Cheating includes, but is not limited to:
  - copying, faxing, emailing, or in any way duplicating assignments that are turned in, wholly or in part, as original work
  - exchanging assignments with other students, either handwritten or computer generated, whether you believe they will be copied or not
  - using any form of memory aid during tests or quizzes without the expressed permission of the instructor
  - giving or receiving answers during tests or quizzes. (It is the student's responsibility to secure his or her papers so that other students will not have the opportunity to copy from them or the temptation to do so.)
  - taking credit for group work when the student has not contributed an equal or appropriate share toward the final result
  - accessing a test or quiz for the purpose of determining the questions in advance of its administration
  - Using summaries/commentaries (*Cliff Notes, Spark Notes, etc.*) in lieu of reading the assigned materials.
- **Plagiarism:** Plagiarism consists of taking another's ideas and/or words and presenting them as if they were your own. Students submitting plagiarized material, in whole or in part, will be subject to penalty at the discretion of the instructor. Plagiarism results in a zero grade on the assignment, loss of credit in that course, and/or other administrative action. **Plagiarism includes, but is not limited to:**
  - taking someone else's assignment or portion of an assignment and submitting it as your own
  - submitting material written by someone else or rephrasing the ideas of another without giving the author's name or source
  - presenting the work of tutors, parents, siblings, spouses, or friends as your own
  - submitting papers from the Internet written by someone else as your own
  - supporting plagiarism by providing your work to others, whether you believe it will be copied or not

**ACKNOWLEDGEMENT**

Our thanks go to the English Department of North Hunterdon-Voorhee Regional High District of Annandale, NJ, for allowing Haywood Community College to use part of North Hunterdon's existing academic honesty policy. The Hunderton policy is available at <http://www.nhvweb.net/nhhs/English/cheatingplagiarismpolicy.htm>.

**SCHEDULE**

<b>DATE</b>	<b>LECTURE TOPIC / ACTIVITY</b>
<b>August 21<sup>st</sup></b>	<b>Introduction, Syllabus Review, Course Policies, Industry Intro</b>
<b>August 28<sup>th</sup></b>	<b>Greenhouse Construction</b>
<b>September 4<sup>th</sup> *</b>	<b>Greenhouse Heating</b>
<b>September 11<sup>th</sup> *</b>	<b>Greenhouse Cooling</b>
<b>September 18<sup>th</sup> *</b>	<b>Environmental Controls</b>
<b>September 25<sup>th</sup> *</b>	<b>Root Substrate/Root Substrate Pasteurization</b>
<b>October 2<sup>nd</sup> *</b>	<b>Watering</b>
<b>October 9<sup>th</sup></b>	<b>Midterm Exam (covers lecture material through September 25<sup>th</sup>)</b>
<b>October 16<sup>th</sup></b>	<b>Fall Recess</b>
<b>October 23<sup>rd</sup></b>	<b>Fertilization</b>
<b>October 30<sup>th</sup> *</b>	<b>Alternative Cropping Systems</b>
<b>November 6<sup>th</sup> *</b>	<b>CO<sub>2</sub> fertilization</b>
<b>November 13<sup>th</sup></b>	<b>Light and Temperature</b>
<b>November 20<sup>th</sup> *</b>	<b>Chemical Growth Regulation</b>
<b>November 27<sup>th</sup> *</b>	<b>Insect Control / Disease Control</b>
<b>December 4<sup>th</sup> *</b>	<b>Postproduction Quality</b>
<b>December 11<sup>th</sup></b>	<b>Final Exam</b>

\*Online Assignment Due.