

ORCHID BIOLOGY AND CULTURE

ORH5282

3 CREDITS

SPRING 2019

“Orchid Hunting is a mortal occupation.”

- Susan Orlean, *The Orchid Thief*

WEB – ONLINE



INSTRUCTOR:

Dr. Wagner Vendrame

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OFFICE HOURS: *By appointment or to be arranged via live chat.*

COURSE COORDINATOR: Dr. Wagner Vendrame

COURSE WEBSITE: <http://elearning.ufl.edu>

COURSE COMMUNICATIONS: *General questions should be posted to the course's discussion board. Private questions should be sent to the instructor through the course management system.*

REQUIRED TEXT: *There is no required textbook for this course, but recommended textbooks are listed:*

Motes, M. 2008. Florida Orchid Growing. Redland Press, Redland, FL.

Arditti, J. 1992. Fundamentals of Orchid Biology. John Wiley & Sons, New York, NY.

Northern, R.T. 1990. Home Orchid Growing. Simon & Schuster, New York, NY.

ADDITIONAL RESOURCES: *Additional reading material will be provided.*

COURSE DESCRIPTION: The principles and practices involved in the biology and production of orchid plants and flowers, including advanced topics and related discussions.

PREREQUISITE KNOWLEDGE AND SKILLS: Plant Diversity - BOT 2011 or Integrated Principles of Biology - BSC 2011. Course prerequisites can be substituted by similar coursework and/or sufficient knowledge in plant biology and horticulture.

PURPOSE OF COURSE: The purpose of Orchid Biology and Culture ORH5282 is to provide students with in depth knowledge on the principles and practices of orchid biology and culture. In addition to exposing students to the beautiful and exciting diverse world of orchids, we aim at providing students with a more in-depth knowledge and appreciation for orchids, to elucidate their potential and value as a commercial ornamental crop, as well as their importance in research and conservation.

COURSE GOALS AND/OR OBJECTIVES: *By the end of this course, students will:*

- Understand the history of orchids and their importance
- Understand the ecology and evolution of orchids, and conservation issues
- Understand the tools used for classifying orchids and how complex classification of orchids is
- Understand orchid nomenclature and terminology used for species and hybrids
- Explain the details about vegetative morphology of orchids
- Explain the details about reproductive morphology of orchids

- Explain the flowering physiology in orchids
- Describe the aspects of orchid media and growing environments
- Understand orchid genetics as specifically related to flower color inheritance
- Understand plant nutrition in orchids
- Learn about the main pests and diseases that affect orchids
- Learn the different pollination mechanisms and pollinators in orchids
- Describe orchid sexual and asexual propagation, including tissue culture
- Appreciate the ethnobotanical utilization of orchids
- Understand commercial production of orchids

TEACHING PHILOSOPHY: I am a strong advocate of developing creative and critical thinking in students. I perceive teaching as stimulating students to think and develop skills to analyze and solve problems, in order to make timely and sound decisions independently. Students should be exposed to different practical challenges to better assimilate and retain the basic concepts. I make a concerted effort to assure active participation and interaction in the classroom, which helps me to give meaning and to concretize abstractions, thus inducing additional creative and critical thoughts.

INSTRUCTIONAL METHODS: My basic approach to teaching is appropriately adapted to each subject matter. After introducing the basic concepts to the students, I encourage discussion to critically evaluate those concepts and guide students towards a common conclusion. This type of interaction enhances significantly the learning process, allowing students to grasp a concept and move on to the next level. I use practical and real-life examples as essential elements in my lectures to stimulate critical thinking. My style and methods of teaching are very open. I like to expose concepts, ideas, examples and other material using a combination of discussion, PowerPoint presentations, and videos.

[It is helpful to students to understand how you have structured the course and how will classes be conducted. If the course has multiple formats (like lecture, lab and discussion, group learning projects and/or presentations) these should be explained clearly.]

COURSE POLICIES:

This is a web-based online course with weekly lectures, assignments, and/or learning activities. Lectures are presented in narrated PowerPoint format. Videos and reading material complement the lectures. All course materials are available via the CANVAS course website.

Students are expected to login to the course website at least once a week and complete all activities listed for each particular module, following the course schedule. This includes participation in online discussions, completion of quizzes, and submission of assignment reports by the respective due dates.

Requirements for class attendance, absences, and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

****COURSE TECHNOLOGY:** [If technology is required for the course, indicate how it will be used, how students can access it, and what support and resources are available for students.]

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive; therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <http://www.dso.ufl.edu/students.php>.

NETIQUETTE: COMMUNICATION COURTESY: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. [Describe what is expected and what will occur as a result of improper behavior]
<http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf>

GETTING HELP:

For issues with technical difficulties for e-learning in Canvas, please contact the e-learning support and UF Help Desk at:

- (352) 392-HELP - select option 2
- <http://elearning.ufl.edu>

Requests for make-ups due to technical issues MUST be accompanied by the ticket number received from e-learning support when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at <http://www.distance.ufl.edu/getting-help> for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit <http://www.distance.ufl.edu/student-complaints> to submit a complaint.

U MATTER, WE CARE INITIATIVE

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor are available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

GRADING POLICIES:

Tasks	Points (Percentage)
Quizzes (5 points each)	16 x 5 = 80/500 (16%)
Discussion Posts (5 points each)	16 x 5 = 80/500 (16%)
Assignments (10 points each)	10 x 10 = 100/500 (20%)
Learning Activities (20 points each)	5 x 20 = 100/500 (20%)
Term Project (140 points)	1 x 140 = 140/500 (28%)
Total	500 (100%)

GRADING SCALE: For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Letter Grade	Grade Points	Numeric Scale
A	4.0	94 – 100%
A-	3.67	90 – 93.99%
B+	3.33	86 – 89.99%
B	3.0	83 – 85.99%
B-	2.67	80 – 82.99%
C+	2.33	76 – 79.99%
C	2.0	73 – 75.99%
C-	1.67	70 – 72.99%
D+	1.33	66 – 69.99%
D	1.0	63 – 65.99%
D-	0.67	60 – 62.99%
E	0.33	< 59.99%

COURSE SCHEDULE SPRING 2019:

Week	Dates	Topic	Lectures	Activities	Graded Work Due
1	Jan 7-11	Module 1 – Introduction and History	Lectures 1 and 2	<p>Reading: The Beauty of Orchids.</p> <p>Discussion topic 1 – Orchids became quite popular and accessible within the last 10 years. Yet, orchid popularity has been steady. What strategies would you consider for improving orchid popularity and at the same time increase demand and consequently commercial production? What would make an orchid more attractive to you?</p> <p>Assignment 1: Introduce yourself to your instructor and classmates and state your interests and goals for the course. Post a short video on the course website (up to 2 min). Watch your instructor's intro video as an example.</p> <p>Assignment 2: "What is an orchid? What makes you differentiate orchids from any other plants? Discuss the characteristics that make an orchid plant an orchid, however without getting into morphological details. This is for the next session.</p> <p>Quiz 1</p>	Jan 12 11:59 pm
2	Jan 14-18	Module 2 – Vegetative Morphology	Lectures 3 and 4	<p>Discussion topic 2 – Suppose someone gave you some unknown orchid. Looking at the plant's morphology, could you define their specific habitat,</p>	Jan 19 11:59 pm

				<p>and guess their environmental growth conditions? If so, would there be any implication for commercial production?</p> <p>Assignment 3: Identify morphological structures shown in PowerPoint (L4-Vegetative Morphology ID). Look at the pictures shown and write down your answers. Describe the potential functions, if any, of those structures.</p> <p>Quiz 2</p>	
3	Jan 21-25	Module 3 – Reproductive Morphology	Lectures 5 – 7	<p>Discussion topic 3 – Would you say that variability in flower shape, color, patterns in orchids is an adaptive/evolutionary characteristic? Why?</p> <p>Discussion topic 4 – Knowing that orchids produce large amounts of seeds, what are the implications for survival? What seed characteristics would help them to maximize germination in the wild? What about the implications of large seed production for commercial production?</p> <p>Learning Activity 1: Acquire an orchid plant and dissect the flower, provide a report with digital images of flower parts and their proper identification. Describe the functions of each part.</p> <p>Quiz 3</p>	Jan 26 11:59 pm
4	Jan 28-Feb 1	Module 4 – Classification and Nomenclature	Lectures 8 – 10	<p>Reading: DNA Data and Orchidaceae Systematics: A New Phylogenetic Classification.</p> <p>Discussion topic 5 – Based on the class information and the reading material, it becomes obvious that</p>	Feb 2 11:59 pm

				<p>orchid classification is a complex topic. Could we simplify orchid classification? How? Discuss some open ideas and utilize your critical thinking. Think inside and outside the box. Any “out there” ideas are welcome for discussion!</p> <p>Assignment 4: Search the web for orchid classification systems, report and discuss your findings</p> <p>Quiz 4</p>	
5	Feb 4-8	<p>Module 5 – Flowering Physiology</p> <p>Module 6 – Evolution of Orchids</p>	<p>Lectures 11 and 12</p> <p>Lecture 13</p>	<p>Reading 1: The Gregarious Flowering of the Orchid <i>Dendrobium crumenatum</i>.</p> <p>Discussion topic 6 – Why would orchids show gregarious flowering characteristics? Any advantages/disadvantages? Could this be used for any commercial purpose? Or would it have any conservation application?</p> <p>Reading 2: Orchid Diversity: An Evolutionary Consequence of Deception?</p> <p>Reading 3: Dating the Origin of the Orchidaceae from a Fossil orchid with its Pollinator.</p> <p>Discussion topic 7 – How have orchids evolved to ensure survival and successful reproduction? What indications of evolutionary traits in orchids would correlate to survival?</p> <p>Assignment 5: List characteristics of orchids that are considered evolutionarily advanced</p>	Feb 9 11:59 pm

				Quiz 5 Quiz 6	
6	Feb 11-15	Module 7 – Orchid Pollination	Lectures 14 and 15	<p>Reading 1: The Role of Preadaptations or Evolutionary Novelties for the Evolution of Sexually Deceptive Orchids.</p> <p>Reading 2: Discovery of Pyrazines as Pollinator Sex Pheromones and Orchid Semiochemicals: Implications for the Evolution of Sexual Deception.</p> <p>Discussion topic 8 – Can specific pollination mechanisms in orchids can be related to evolutionary characteristics? What are the pros and cons of such diverse pollination mechanisms? Considering the eternal “egg-chicken” question, did orchids evolve to pollinator characteristics (to be receptive to pollinators), or did pollinators evolve to fit orchid reproductive flower characteristics?</p> <p>Assignment 6: List the most unique characteristics of orchid flowers that facilitate cross-pollination. How have such characteristics originated? Discuss your thoughts and potential hypotheses.</p> <p>Quiz 7</p>	Feb 16 11:59 pm
7	Feb 18-22	Module 8 – Orchid Genetics	Lectures 16 – 19	<p>Reading 1: Why are Orchid Flowers so Diverse? Reduction of Evolutionary Constraints by Paralogues of Class B Floral Homeotic Genes.</p> <p>Reading 2: Molecular Genetics of Reproductive Biology in Orchids.</p>	Feb 23 11:59 pm

				<p>Discussion topic 9 – How could genetics be used to creatively improve orchids? We know that breeding and genetic improvement can be used for improving many characteristics in plants. Specifically to orchids, how can genetics be used in a more creative manner to improve commercialization of orchids and also for conservation purposes? Think critically and creatively.</p> <p>Quiz 8</p>	
8	Feb 25- Mar 1	<p>Module 9 – Media and Growing Environment</p> <p>Module 10 – Mineral Nutrition</p>	<p>Lectures 20 and 21</p> <p>Lectures 22 and 23</p>	<p>Reading 1: Fertilizer Source and Medium Composition affect Vegetative Growth and Mineral Nutrition of a Hybrid Moth Orchid.</p> <p>Reading 2: Impact of a High Phosphorus Fertilizer and Timing of Termination of Fertilization on Flowering of a Hybrid Moth Orchid.</p> <p>Learning Activity 2: Design your own orchid medium and explain properties. Why is it good for orchids?</p> <p>Discussion topic 10: There are no studies showing nutritional deficiencies in orchids for all elements, both macro and micro. How you would design a study to evaluate nutritional deficiency in orchids? You were given an orchid. How would you design an optimum fertilizer for this orchid? Think about it.</p> <p>Assignment 7: Visit local garden store(s) and identify commercial media and fertilizers available that are specific for orchids. What do you think about fertilizers available for orchids? What types of nutrients you think would be most important for orchids and why?</p>	Mar 2 11:59 pm

				Quiz 9 Quiz 10	
9	Mar 2-9	Spring Break			
10	Mar 11-15	Module 11 – Propagation of Orchids	Lectures 24 – 27	<p>Reading 1: Micropropagation of Orchids: A Review on the Potential of Different Explants.</p> <p>Reading 2: In Vitro Propagation and Plantlet Regeneration from <i>Doritaenopsis</i> Purple Gem 'Ching Hua' Flower Explants.</p> <p>Reading 3: Orchid Mycorrhiza: Implications of a Mycophagous Life Style.</p> <p>Discussion topic 11 – How do mycorrhizae correlate with seed production in orchids? Could this knowledge be used for commercial purposes? Is micropropagation a good tool for the conservation of orchids? What are the pros and cons?</p> <p>Quiz 11</p>	Mar 16 11:59 pm
11	Mar 18-22	Module 12 – Ecology and Conservation	Lectures 28 and 29	<p>Reading: Orchid Cyropreservation</p> <p>Discussion topic 12: Is cryopreservation feasible for orchid conservation?</p> <p>Assignment 8: Search for organizations related to orchid conservation and check whether cryopreservation protocols are being used and for what purpose.</p> <p>Quiz 12</p>	Mar 23 11:59 pm

12	Mar 25-29	Module 13 – Ethnobotany of Orchids	Lecture 30	<p>Reading 1: The Ethnobotany of South African Medicinal Orchids.</p> <p>Discussion topic 13: What other ethnobotanical uses of orchids could you envision? Be creative.</p> <p>Assignment 9: Perform a search on additional ethnobotanical uses of orchids and list some unique and curious uses of orchids worldwide.</p> <p>Quiz 13</p>	Mar 30 11:59 pm
13	Apr 1-5	Module 14 – Commercial Production of Orchids	Lectures 31 and 32	<p>Reading: Development of <i>Phalaenopsis</i> Orchids for the Mass-Market.</p> <p>Discussion topic 14: Discuss creative ways for improving orchid commercialization. Consider the diversity in the family.</p> <p>Video segments - orchid nurseries: Video 1: Altria Lab Plants Video 2: Silver Vase Video 3: Motes orchids</p> <p>Assignment 10: You are starting an orchid nursery. How can you have a production system, including potential species to be commercialized that guarantees the success of your business? What strategies would you use? Be creative.</p> <p>Learning activity 3: Visit an orchid nursery and report the type of production system and production details. Is it a profitable business? How could it be improved, if necessary?</p>	Apr 6 11:59 pm

				Quiz 14	
14	Apr 8-12	Module 15 – Orchid Pop Culture	No Lecture	<p>Reading 1 (Short Abstract): Role of Orchid Societies and Growers in Conservation</p> <p>Discussion topic 15 – When I usually give talks to orchid societies, not many young people are present. How would you attract and/or encourage your friends to participate in orchid societies? What about younger people in general? Are there any benefits to orchid societies as related to orchid commercialization, conservation, and research?</p> <p>Video segments: Video 1: Aspects of Orchid Judging Video 2: Orchid Societies Video 3: Orchid Shows</p> <p>Learning activity 4: Plan to attend an orchid society meeting and/or an orchid show/exhibit that is closest to your location. Observe the society dynamics, engagement of members and components of a meeting. What would you change? Or would you?</p> <p>Quiz 15</p>	Apr 13 11:59 pm
15	Apr 15-19	Module 16 – Orchid Pests and Diseases	Lectures 33-35	<p>Discussion topic 16: How could we minimize use of pesticides for orchid pest control? Any alternatives you could think of?</p> <p>Learning activity 5: Visit a local orchid nursery and try identifying any existing pests and diseases. What are the problems and issues you identify as potential causal agents of such pests and diseases in the nursery visited?</p>	Apr 20 11:59 pm

				Quiz 16	
16	Apr 22	Term Papers Due			Apr 22 11:59 pm
	Apr 24	Last Day of Classes			

Disclaimer: *The syllabus and course schedule are subject to change as the needed.* This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes are not unusual and should be expected and will be communicated clearly.