

Tropical Botany - BOT 3663  
Fall 2017 Syllabus & Schedule—*modified 8/23*

**Your instructor:** John Cozza, Department of Biological Sciences

**Contact:** [jcozza@fiu.edu](mailto:jcozza@fiu.edu) (not by Blackboard; include “BOTANY” in subject line)

**Office hours in OE 216:** Mon 5-6+, Tues 1-3 & 5-6+, Weds 2-3 & 5-6+ (*but not the evenings of 9/6, 10/4, 11/1*); after class, or by appointment. Office phone: 305-348-4932

**Lecture and discussion time (required):** MWF 1:00 – 1:50 pm

**Room:** Green Library 165

Introduction:

We will explore the amazing diversity of plant life in the tropics—and the research that seeks to explain it. We’ll see and discuss tropical plants’ fascinating adaptations, interactions (including human uses), and evolution. On this journey through Earth’s biodiversity hotspots, we will employ active and interactive learning, and you will develop skills in interpreting and communicating scientific hypotheses and evidence.

Prerequisite: BSC 1011 (General Biology 2) or equivalent; *review concepts as needed!*

Biology major distribution area: Organismal diversity

Required materials:

- 1) There is no text. Articles and chapters from several books are posted on Blackboard. *This means that your readings are handpicked to go with each lecture or activity!*
- 2) Selections from the scientific literature, posted on Blackboard.
- 3) i-clicker device (*not the app!*), available at the bookstore.

Learning objectives: By the end of the course, you will be able to

- Explain tropical climates, and discuss hypotheses for tropical plant diversity.
- Identify major vegetative and reproductive characters of plants, and use to infer possible phylogenetic homologies.
- Identify and contrast major tropical biomes and plant communities.
- Discuss and compare adaptations of tropical plants for growth, nutrient acquisition, defense, reproduction, and dispersal.
- Interpret and synthesize scientific results from the botanical literature, individually and in groups.
- Convey botanical concepts and information in an interesting and accurate presentation about a useful tropical plant; formulate and ask questions about colleagues’ presentations.
- Participate in a service activity that supports tropical plant conservation or education.

Course products:

- **3 exams:** two midterms and a cumulative final. Exams will be all scantron questions, and will cover what we do in class, including the relevant material from the readings. About half of the final will cover the new material since exam 2, and the other half will be divided between exam 1 and exam 2 material. *If you miss an*

exam for a university approved reason (medical emergency, death in the immediate family, jury or military duty, etc.) you must *officially document* it and let me know ASAP. If you miss a midterm and document it, the final exam grade would also become the make-up grade for the missed midterm. If you miss the final and document it, you would receive an IN grade, and then you must take a written (essay questions) or oral make-up exam in the spring semester.

- **5 written assignments** (1-3 pages each; one is a labeled powerpoint) due one week after the day of the activity, or as announced. Assignments must be handed in as hard copies and submitted digitally to turnitin.com. Assignments include individual and group activities based on readings, internet research, guest speakers, field observations, etc. **You must attend the relevant classes prepared, and actively participate** to get credit.
- A **6-8 minute illustrated powerpoint presentation** on a useful tropical plant species that you will do with two partners. Detailed instructions and an example will be given in class.
- **Daily written class participation**, to be handed in at the end of class. On most lecture/discussion days and *all guest speaker and presentation days*, you will write and hand in a brief feedback. Your written responses will be graded as “full effort” (1 point), “partial effort” (0.5 point) or “minimal effort or copied” (0 point). To earn full credit, you must show clear evidence of thought and engagement, and communicate that in concise, complete sentences. You may discuss your ideas with your neighbor, but your written response must be entirely your own original work. At the end, your participation grade will be the percentage you earned of the total possible points. You may miss one participation activity without penalty. *Participations count as much as an exam, and are an easy way to **raise your grade** if you attend every class, or conversely, a sure way to lower your grade if you miss class. **You must be present to participate, and you cannot make up participation activities afterwards!***
- A relevant half-day **service activity** such as helping with habitat restoration, clean-up, or tree planting (e.g. with TREEmendous Miami, Urban Paradise Guild, or Miami-Dade county); volunteering at a botanical garden (e.g. Fairchild, Gifford Arboretum, FIU Preserve), or giving an educational lesson about tropical botany or conservation to a school or community organization. I will give some suggestions for upcoming activities as the semester progresses. You may choose an activity that I don't mention, but then *please discuss your idea with me in advance*. Don't wait until the last minute to explore this! **You must do an approved and officially verified service activity to receive a grade in the course.** Your last written assignment will be a brief report on what you accomplished and learned in your service activity.

#### Grading:

Midterm exams (2 @ 15%)	30%
Final exam:	20%
Short written assignments (5 @ 5%)	25%
Presentation on a useful tropical plant	10%
Daily written participation activity	15%
Service activity	Required
Extra credit (clickers)	up to 5% extra

We will use **clickers** every day to enable active learning, gauge your understanding, and stimulate discussion. Clicker extra credit will be calculated as follows. You will earn 1 raw clicker point for participating in each question, and 1 additional point if you answer it correctly. At the end, your raw point total will be scaled to a maximum of 5% extra credit, with the highest total in the class scaling to the full 5%.

Grades: A = 93-100%, A- = 90-92%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 70-76%, D = 60-69, F = 0-59%.

A grade of “C” or better is required to earn credit in the biology major. Grades will be rounded up or down to the nearest 1%. There will be no curving, and no unearned points will be added to anyone’s grade. The only extra credit available will be that earned by using your clicker, or by participating in and writing about selected enrichment activities announced in class.

#### How to use turn-it-in:

Consider each highlight on the “originality report” that turn-it-in provides. If it’s coincidental (something anyone could say, e.g. “the causes of tropical rainforest biodiversity”) then it’s OK. But if it’s the specific wording of your author or website, or another student, then you have to remove it. And you can’t just change a few words—turn-it-in will still detect this—you must completely rewrite the highlighted sentence(s) in your own words. *If in doubt—rewrite! The best way to avoid plagiarism is simply to not have the source in front of you (or up on the screen) while you are writing! **And you can never cut-and-paste an author’s text into your document--ever!***

#### General expectations and how to succeed:

- **Read** the assigned chapters & papers thoughtfully in advance of the appropriate lecture or activity.
- **Attend every class on time** and *actively* participate in discussions, interactive questions, and activities. Research by Dr. Helen Young (Middlebury College) showed a 2% lower grade for each missed class in a similar course. Likewise, studies show that active, social engagement with the material produces meaningful, enduring learning.
- **Take good lecture notes**, *preferably handwritten*. Indicate any areas of difficulty to look up after class. Structure your notes as lists, outlines, concept maps, or in some other form that is useful to you. This initial processing of the information begins the process of making it your own, aka *learning* it!
- **Ask questions**; ask for clarification ASAP. There are no stupid questions!
- **Help your neighbor** and contribute to the group. If you help each other, everyone will do better including you!
- **Review concepts** ASAP after class, using the readings, links on the slides, and other resources to clarify any hazy areas. Try to find the answers to your questions yourself, or through active participation in a study group. Assess your knowledge continuously.
- **Come to office hours** with any questions you are still unsure about, or just to talk about tropical plants!

- **Read all course emails and announcements** on Blackboard! You are responsible for all information in them, as well as anything announced or posted in class.
- **Take care of yourself:** Eat well, drink water, sleep, exercise, go outside!

Honor policies:

As scientists and scholars, we hold ourselves to the highest standards of integrity. The FIU honor policy will apply fully to our work in this class. Any *cheating* on exams or *plagiarism* on written work will result in a grade of F for the assignment and, if warranted, the course. *Signing someone else's name* on a class sign-in sheet will result in loss of participation points for both people. *Using more than one clicker* will result in temporary confiscation of both clickers, and permanent loss of clicker points for the owner and perpetrator. All course materials are for your use only—do not share, post, or sell (it's stealing). *Serious dishonor or cheating* will result in academic misconduct charges.

As a progressive learning community, we respect and protect the civil rights of everyone, regardless of gender, race, ethnicity, place of origin, or disability.

Academic misconduct definitions and procedures are detailed at:

<http://academic.fiu.edu/academicbudget/misconductweb/1acmisconductproc.htm>.

FIU's student code of conduct, and policies on discrimination and sexual harassment, are available at: <http://regulations.fiu.edu/regulation>.

Accommodations for disabilities are arranged through the Disability Resources Center.

See: <http://studentaffairs.fiu.edu/get-support/disability-resource-center/index.php>.

***This syllabus and the schedule below, particularly the time devoted to each topic, may change at any time to better meet the needs of the group, or due to unforeseen circumstances.*** All changes will be announced in class or via Blackboard. The most current version will be kept updated on Blackboard, so check there if in doubt.

Week	Date	Topic, written activity, or group presentation	Reading due (all on Blackboard)
1	21 Aug 23 25	Course introduction The tropics and climate The tropics and biodiversity	Syllabus (asap) Lambertini chaps. 1, 2 Lambertini chaps. 3, 4
2	28  30  1 Sept	Plant phylogeny: concepts & overview <i>Aug 28: add/drop; Aug 29: \$\$ due</i> Phylogeny and diversity of tropical plants  Build a phylogeny	What is phylogeny? / Genetic connections (TOL) + What is cladistics? (Clos 1996) For review: Embryophyte, Gymnosperm, Flowering plant (Wikipedia) <i>Bring printed phylogeny (Blackboard)</i>
3	4 6 8	<b>Labor Day holiday—no class</b> Plant morphology: vegetative Plant morphology: reproductive	Shumway 2009 Cocks 2014, Nelson 2012
4	11 13 15	<b>1) Tropical plant families: virtual safari</b> Plant architecture <b>Plant safari presentations: (#1-7)</b>	<i>Bring computer to class</i> Tomlinson 1983 <i>By Thurs 8 PM: Upload safari powerpoint</i>
5	18 20 22	<b>Plant safari presentations: (#8-13)</b> <b>Plant safari presentations: (#14-19)</b> <b>Plant safari presentations: (#20-25)</b>	<i>By Sun 8 PM: Upload safari powerpoint</i> <i>By Tues 8 PM: Upload safari powerpoint</i> <i>By Thurs 8 PM: Upload safari powerpoint</i>
6	25 27 29	Lowland rainforest: structure <b>EXAM #1 on weeks 1-5</b> Lowland rainforest: structure	Kricher chap. 3  Kricher chap. 3
7	2 Oct  4 6	<b>Useful tropical plants and presentation example;</b> Lowland rainforest structure <b>Guest speaker, Dr. Jason Downing: "Orchids"</b> Lowland rainforest: species diversity	<b>Vietmeyer 2008</b> , Newitz 2017, HMNS 2015 <i>Last day to revise and resubmit safari</i> <b>Roberts 2008</b> Kricher chap. 5
8	9 11 13	Lowland rainforest: species diversity Tropical dry forest Tropical dry forest	Kricher chap. 5 Holzman chap. 4 Holzman chap. 4
9	16 18 20	Savanna <b>2) Ask 20 questions: meet at FIU Preserve (due 11/6)</b> Savanna	Solbrig 1996 <b>Fox 2014</b> Solbrig 1996, Rapoza 2014
10	23 25 27	Thorn forest <b>EXAM #2 on weeks 6-9</b> <b>Useful plant presentations (#1-5)</b>	WWF 2014
11	30 1 Nov 3	<b>3) Guest speaker, Dr. Javier Ortega: "Plant diversity in the Caribbean" (Mon &amp; Weds; due 11/13)</b> <b>Useful plant presentations (#6-10)</b>	<b>Adams 1997</b> <span style="float: right;"><i>Oct 30: last DR</i></span>
12	6 8 10	Desert and inselbergs <b>Useful plant presentations (#11-15)</b> <b>Veterans' Day holiday—no class</b>	Lambertini ch. 10, Porembski 2007
13	13 15 17	Mountain: cloud forest and elfin forest <b>4) PBL: Design an arboretum exhibit! (due 12/1)</b> <b>Useful plant presentations (#16-20)</b>	Kricher chap. 12: pp. 422-436 <b>Jon Coe 2004; Villagra-Islas 2011</b>
14	20 22 24	Mountain (high elevation) and river <b>Useful plant presentations (#21-25)</b> <b>Thanksgiving holiday—no class</b>	Kricher chap. 12: 436-463
15	27  29  1 Dec	Mangrove, beach, and seagrass  The un-plants: parasites and carnivores  Tropical plant conservation discussion	Kricher chap. 12: pp. 463-468; Araujo 2004, Atwell 2010, Heck 2008 Moran 2006, Pavlovic 2012, Shaw 2017, Wood 2014 Boucher 2011, Boucher 2014, Audissou 2007 <b>5) Report on service activity due</b>
Finals	4 Dec	<b>FINAL EXAM on weeks 10-15 + cumulative: 12-2 pm in GL 165</b>	

## Course readings and resources

- Adams, C. 1997. Caribbean islands regional overview. In Davis, S., et al. (editors). *Centres of Plant Diversity: A Guide and Strategy for their Conservation*, Volume 3: the Americas. IUCN Publications Unit, Cambridge, England. <http://botany.si.edu/projects/cpd/>. Accessed 10/11/2015 and modified by JC (on Blackboard).
- Araujo, D. and M. Pereira. 2004. Sandy coastal vegetation. *Encyclopedia of Life Support Systems*. <http://www.eolss.net/ebooks/Sample%20Chapters/C20/E6-142-TB-08.pdf>. Accessed 8/16/2014.
- Atwell, B., P. Kriedemann, C. Turnbull, et al. editors. 2010. Seagrasses: angiosperms adapted to sea floors. *Plants in Action*, 1<sup>st</sup> edition, Chapter 18.2. Macmillan Education Australia. <http://plantsinaction.science.uq.edu.au/edition1/?q=print/book/export/html/497>. Accessed 8/16/2014.
- Audissou, J-A. 2007. Madagascar: which future? *Cactus-Adventures International*, 76, 2-10. [https://www.cactuspro.com/articles/\\_media/madagascar\\_quel\\_avenir:madagascar\\_cai76-oct2007eng.pdf](https://www.cactuspro.com/articles/_media/madagascar_quel_avenir:madagascar_cai76-oct2007eng.pdf). Accessed 8/18/2017.
- Barrett, S. 2002. The evolution of plant sexual diversity. *Nature Reviews Genetics*, 3(4), 274-284.
- Boucher, D. 2011. Introduction. In *The root of the problem: what's driving tropical deforestation today?* Union of Concerned Scientists report, Chapter 1. [http://www.ucsusa.org/global\\_warming/solutions/stop-deforestation/drivers-of-deforestation.html](http://www.ucsusa.org/global_warming/solutions/stop-deforestation/drivers-of-deforestation.html). Accessed 8/17/2014.
- Boucher, D., P. Elias, J. Faires, S. Smith. 2014. *Deforestation success stories*. Union of Concerned Scientists report. <http://www.ucsusa.org/forestsuccess>. Accessed 8/18/2017.
- Clos, L. 1996. What is cladistics? <http://www.fossilnews.com/1996/cladistics.html>. Accessed 1/5/2014.
- Cocks, M. 2014. The parts of a flower: stamens, carpels, corolla, calyx. <http://www.botany.uwc.ac.za/ecotree/flowers/flowerparts1.htm>. Accessed 8/21/2014.
- Fox, L. 2014. How to ask research questions (or frame hypotheses). Bioe 147/247 course website, University of California at Santa Cruz. [http://courses.pbsci.ucsc.edu/eeb/bioe147/Assignments\\_files/Questions and Hypotheses\\_How they should be framed.pdf](http://courses.pbsci.ucsc.edu/eeb/bioe147/Assignments_files/Questions_and_Hypotheses_How_they_should_be_framed.pdf). Accessed 8/16/2014 and modified by JC (on Blackboard).
- Greig, N. 2015. Ants in your Plants: Mutualism benefits both myrmecophyte and insect. *Beyond Bones*, Houston Museum of Natural Science. <http://blog.hmns.org/2015/05/ants-in-your-plants-symbiosis-benefits-both-myrmecophyte-and-insect/>. Accessed 10/2016 and images added by JC (on Blackboard).
- Heck Jr, K., T. Carruthers, C. Duarte, A. Hughes, G. Kendrick, R. Orth, & S. Williams. 2008. Trophic transfers from seagrass meadows subsidize diverse marine and terrestrial consumers. *Ecosystems*, 11(7), 1198-1210.

- Heywood, V. 2007. *Flowering Plant Families of the World*. Royal Botanic Gardens, Kew, London. 424 pages. [Available in the reference collection of Green Library]
- Holzman, B. 2008. *Tropical Forest Biomes*. Greenwood, Santa Barbara, CA, *ABC-CLIO eBook Collection*, 242 pp.
- Jon Coe Design 2004. Trends in botanical displays.  
[http://www.joncoedesign.com/arboretum/arb\\_trends.htm](http://www.joncoedesign.com/arboretum/arb_trends.htm). Accessed 8/16/2014.
- Kricher, J. 2011. *Tropical Ecology*. Princeton University Press, Princeton, NJ, 632 pp.
- Lambertini, M. 2000. *A Naturalist's Guide to the Tropics*. University of Chicago Press, Chicago, IL. 312 pp.
- Moran, J. (2006). Life and death in a pitcher. *Natural History* magazine, 115 (8, October issue), 56-62.
- Nelson, R. 2009. Terms describing the inflorescence. *The Description of Flowers*.  
<http://www.cs.rochester.edu/~nelson/wildflowers/glossaries/flowers/index.html>. Accessed 1/14/2014.
- Newitz, A. 2017. Evidence that ancient farms had very different origins than previously thought.  
<https://arstechnica.com/science/2017/08/evidence-that-humans-had-farms-30000-years-earlier-than-previously-thought/>. Accessed 8/10/2017.
- Pavlovič, A. 2012. Adaptive radiation with regard to nutrient sequestration strategies in the carnivorous plants of the genus *Nepenthes*. *Plant Signaling and Behavior*, 7(2), 295–297.
- Porembski, S. 2007. Tropical inselbergs: habitat types, adaptive strategies and diversity patterns. *Brazilian Journal of Botany*, 30(4), 579-586.
- Rapoza, M. 2014. Ants and whistling-thorn trees are in a symbiotic relationship and “it’s complicated.” *Corner of the cabinet: a blog for naturalists*,  
<http://cornerofthecabinet.com/2014/03/03/ants-and-acacia-whistling-thorn-symbiotic-relationship/>. Accessed 11/8/2014.
- Roberts, D. and K. Dixon. 2008. Orchids. *Current Biology*, 18(8), R325-R329.
- Shaw, J. 2017. Colossal blossom: Pursuing the peculiar genetics of a parasitic plant. *Harvard Magazine*, March issue. <http://harvardmag.com/pdf/2017/03-pdfs/0317-44.pdf>. Accessed 8/19/2017.
- Shumway, S., S. Letcher, A. Friberg, and D. DeMelo. 2009. How to examine a plant.  
[http://wikis.wheatonma.edu/rainforest/index.php?title=How\\_to\\_Examine\\_a\\_Plant\\_in\\_RainforestPlants](http://wikis.wheatonma.edu/rainforest/index.php?title=How_to_Examine_a_Plant_in_RainforestPlants), [http://wikis.wheatonma.edu/rainforest/index.php/Main\\_Page](http://wikis.wheatonma.edu/rainforest/index.php/Main_Page). Accessed 1/14/2014.
- Solbrig, O., E. Medina, and J. Silva. 1996. Biodiversity and tropical savanna properties: a global view. *Scope-Scientific Committee on Problems of the Environment International Council of Scientific Unions*, 55, 185-211.
- Stevens, P. F. 2001 onwards. Angiosperm Phylogeny Website (APG III). Version 13.  
<http://www.mobot.org/MOBOT/research/APweb/>. Accessed 1/14/2014.

Tomlinson, P. B. 1983. Tree architecture: new approaches help to define the elusive biological property of tree form. *American Scientist*, 71(2), 141-149.

TOL (Tree of Life web project). What is Phylogeny? / Genetic connections.  
<http://tolweb.org/tree/learn/concepts/whatisphylogeny.html> and  
<http://tolweb.org/tree/learn/concepts/geneticconnections.html>. Accessed 1/5/2014.

Vietmeyer, N. 2008. Underexploited Tropical Plants with Promising Economic Value: The Last 30 Years. *Trees for Life Journal*: 3(1).  
<http://www.tfljournal.org/article.php/20070821145316291>.

Villagra-Islas, P. (2011). Newer Plant Displays in Botanical Gardens: The Role of Design in Environmental Interpretation. *Landscape Research*, 36(5), 573-597.

Wikipedia contributors 2014. Embryophytes; Gymnosperms. *Wikipedia*.  
<http://en.wikipedia.org/wiki/Embryophyte>, <http://en.wikipedia.org/wiki/Gymnosperm>.  
Accessed 9/6/2014.

Wikipedia contributors 2014. Flowering Plant. *Wikipedia*.  
[http://en.wikipedia.org/wiki/Flowering\\_plant](http://en.wikipedia.org/wiki/Flowering_plant). Accessed 9/6/2014.

Wood, C. 2013. The world of parasitic plants. *Catalyst*, December issue.  
[https://www.stem.org.uk/system/files/elibrary-resources/legacy\\_files\\_migrated/31069-Catalyst%2024%202%20563.pdf](https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/31069-Catalyst%2024%202%20563.pdf). Accessed 8/19/2017.

WWF (World Wildlife Fund) 2014. Deccan thorn scrub forests; Madagascar spiny thickets; Madagascar succulent woodlands; Caatinga. *Encyclopedia of Earth*.  
<http://www.eoearth.org/view/article/151665/>, <http://www.eoearth.org/view/article/154345/>,  
<http://www.eoearth.org/view/article/154347/>, <http://www.eoearth.org/view/article/150842/>.  
Accessed 8/18/2014 and modified by JC (pictures added—on Blackboard).