

CITY UNIVERSITY OF NEW YORK GRADUATE SCHOOL
Ph.D. PROGRAM IN BIOLOGY – 2010 PLANT SCIENCES FIRST EXAMINATION

Reading list and preparation instructions

Reading list for first exam (basic botany, systematics):

Raven, P.H., R.F. Evert & S.E. Eichhorn. 2005. *Biology of Plants*, 7th ed. W.H. Freeman and Company, New York, NY.

Judd, W.S., C.S. Campbell, E.A. Kellogg, P.F. Stevens & M.J. Donoghue. 2008. *Plant Systematics: A Phylogenetic Approach*, 3rd ed. Sinauer Associates, Sunderland, MA. **Chapters 1–7.**

Systematics:

Papers from which essay questions will be asked (papers will be provided at the exam):

1. Todd J. Barkman, Joel R. McNeal, Seok-Hong Lim, Gwen Coat, Henrietta B. Croom, Nelson D. Young and Claude W. dePamphilis (2007). Mitochondrial DNA suggests at least 11 origins of parasitism in angiosperms and reveals genomic chimerism in parasitic plants. *BMC Evolutionary Biology* 7: 248 (15pp).
2. Victor A. Albert, Stephen E. Williams and Mark W. Chase (1992). Carnivorous Plants: Phylogeny and Structural Evolution. *Science* 257: 1491–1495.

Developmental Biology:

Papers from which essay questions will be asked (papers will be provided at the exam):

1. Michalis Barkoulas, Angela Hay, Evagelia Kougioumoutzi, and Miltos Tsiantis (2008). A developmental framework for dissected leaf formation in the *Arabidopsis* relative *Cardamine hirsuta*. *Nature Genetics* 40: 1136-1141.
2. Kramer, E. M., L. Holappa, B. Gould, M. A. Jaramillo, D. Setnikov, and P. M. Santiago (2007). Elaboration of B Gene Function to Include the Identity of Novel Floral Organs in the Lower Eudicot *Aquilegia*. *The Plant Cell*, 19: 750–766.

Bioinformatics:

Papers from which essay questions will be asked (papers will be provided at the exam):

1. Aswath Manoharan, Jeannie Stamberger, YuanYuan Yu, and Andreas Paepcke (2008). Optimizations for the EcoPod field identification tool. *BMC Bioinformatics* 9: 150.
2. Alexander Pertsemlidis and John W Fondon III (2002). Having a BLAST with bioinformatics (and avoiding BLASTphemy). *Genome Biology* 2(10): reviews.2002.1–2002.10.

Plant Physiology

Plant Physiology, 4th ed. Taiz and Zeiger, 2006: Chapters 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, and 26.

Papers from which essay questions will be asked (papers will be provided at the exam):

1. Stacey, M. G., A. Patel, W. E. McClain, M. Mathieu, M. Remley, E. E. Rogers, W. Gassmann, D. G. Blevins, and G. Stacey. 2008. The *Arabidopsis* AtOPT3 protein functions in metal homeostasis and movement of iron to developing seeds. *Plant Physiol* 146: 589-601. (with supplement).
2. Tognetti, V. B., J. F. Palatnik, M. F. Fillat, M. Melzer, M. R. Hajirezaei, E. M. Valle, and N. Carrillo. 2006. Functional replacement of ferredoxin by a cyanobacterial flavodoxin in tobacco confers broad-range stress tolerance. *Plant Cell* 18: 2035-50.

Phytochemistry

Reference: Dewick, Paul M. 2002. *Medicinal natural products: a biosynthetic approach*. Third Ed., John Wiley and Sons, NY.

Papers from which essay questions will be asked (papers will be provided at the exam):

1. Jaki, B. U., S. G. Franzblau, L. R. Chadwick, D. C. Lankin, F. Zhang, Y. Wang, and G. F. Pauli. 2008. Purity-activity relationships of natural products: the case of anti-TB active ursolic acid. *J Nat Prod* 71: 1742-8.
2. Wang, H., M. G. Nair, G. M. Strasburg, Y. C. Chang, A. M. Booren, J. I. Gray, and D. L. DeWitt. 1999. Antioxidant and antiinflammatory activities of anthocyanins and their aglycon, cyanidin, from tart cherries. *J Nat Prod* 62: 802.

Preparation for the exam

The exam will be given on one day and consist of three sections (700 pts). Session I (100 pts) must be handed in before the start of the exam in both electronic and hard copy. Sessions II and III (each 300 pts) will draw from the reading list above. Students must pass with a minimum of 70% or 490 points.

SESSION I. ESSAY to submit before the morning session. (TOTAL 100 pts)

Instructions: Submit the Session I essay in hard copy and in electronic form as a PDF file. Do not put your name on either, use your student number for filename and for marking the hard copy. Make sure that in “properties” there is no notation of “author”.

Present a subject, problem, hypothesis, theory, or controversy you consider important to plant sciences. **The essay must be hypothesis driven.** The essay should show relevance across the botanical subdisciplines. The essay should be both a review and a synthesis and demonstrate the level of scholarship, criticism, and independent thinking we require at the doctoral level. Your topic may be a large or a small one; broad or highly specialized; and you must communicate how the chosen topic is relevant to a major concept. We wish to measure the ability to understand and to synthesize information and ideas from more than one discipline of biology. The paper should have a title and begin with a **one paragraph abstract/summary which includes your hypothesis.** The paper should be paginated and written with 11 pt. Arial or equivalent font, one-inch margins, and a **maximum of five (5) pages of double spaced text** followed by a minimum of 15 (complete) literature citations provided in the format required by the journal, Plant Physiology (see: <http://www.plantphysiol.org/misc/ifora.shtml>). Following the literature citation section, provide the names (from faculty in the CUNY Biology PhD program) of two potential “reviewers” along with their areas of expertise which you feel make them appropriate to reviewers of your manuscript. *Note: an essay based largely on the published work or grant proposals of faculty staff members or scientists at other institutions is not acceptable. The essay must be your own idea and not the product of a collaborative effort. Faculty should not be consulted in development of your essay.*

SESSION II. MORNING (TOTAL 300 pts)

Instructions:

- 1-Basic Botany: definitions and short answer botany questions (100 pts)
- 2- Write an essay in each of two subject areas (Taxonomy/systematics, Bioinformatics) (100 pts each essay, for a total of 200 pts). For each topic area, students must choose one of the two essay questions.

SESSION III. AFTERNOON (TOTAL 300 pts)

Instructions: Answer one essay in each of three subject areas (Phytochemistry, Plant Physiology, Plant Development) (100 pts each essay, for a total of 300 pts). For each topic area, students must choose one of the two essay questions.