CONCENTRATION REQUIREMENTS FOR THE PLANT SCIENCE MAJOR

SPRING 2015 OR EARLIER

With input from the faculty in the five Plant Science sections, the School of Integrative Plant Science (SIPS) has instituted a requirement that all students matriculating in Fall 2012 or later declare a concentration, minor or second major. This will provide a more focused approach to coursework in the major with an eye toward providing Plant Science students with marketable skills for immediate post-graduation employment or transition to graduate or professional study.

By the beginning of their junior year, all PS students who matriculated as freshmen or sophomores must declare a PS concentration OR an intention to complete requirements for a CALS minor in a field of study outside of the Plant Sciences OR a second major in CALS. Students matriculating as junior transfer students must declare an intended concentration, minor or second major by the end of their first semester at Cornell. In addition to the CALS requirements and the general requirements for the Plant Science program, Plant Science majors must satisfy all course requirements for one of the PS concentrations listed below OR an approved minor (see last page) or second major in lieu of one of these PS concentrations.

The five Plant Science concentrations are:

I. Evolution, Systematics, and Ecology
II. Plant Genetics and Breeding
III. Plants and Human Health
IV. Plant Physiology and Molecular Biology
V. Sustainable Plant Production and Landscape Management

Although incoming freshmen have two years to settle on a concentration in the major or to declare a minor/second major, it is prudent to begin to develop at least one back-up plan early on. Academic advisors will provide some guidance, but final decisions are at the discretion of each student. Selection of a minor outside of the major in lieu of a concentration may require even more advance planning, and we strongly suggest that students planning that route eventually enlist the assistance of an academic advisor in that minor field of study.

I. Evolution, Systematics and Ecology Concentration
Students who choose to concentrate in Plant Evolution, Ecology, and Systematics should complete the following courses in conjunction with those required for all Plant Science majors:

1. BIOEE 1610 (Ecology and the Environment)
2. BIOEE 1780 (Evolutionary Biology and Diversity)
3. Either BIOEE/NTRES 2670 (Conservation) or NTRES 2010 (Environmental Conservation)
4. Either PLBIO 2430 (Taxonomy of Cultivated Plants) or PLBIO 2480 (Vascular Plant Systematics)

(NOTE: Requirements for the major include only one course in ecology/environmental biology. Students concentrating in Evolution, Systematics and Ecology must take these four above.)

In addition, students in this concentration are strongly encouraged but not required to take as many of the following courses as their schedules will allow:

| PLPPM 3090 (Fungi) | PLBIO 2470 (Plants and People) |
| PLBIO 4470 (Molecular Systematics) | PLPPM 3190 (Mushrooms of Field and Forest) |
| PLBIO/ENTOM 4400 (Phylogenetic Systematics) | BIOEE 4660/4661 (Physiological Plant Ecology) |
| PLBIO 4480 (Plant Evolution and the Fossil Record) | Lecture/Laboratory |
| PLBIO 4520/4521 (Systematics of Tropical Plants) | PLBIO 3450 (Plant Anatomy) |
| | PLBIO 3590 (Biology of Grasses) |
II. **Plant Genetics and Breeding Concentration**

Students who choose to concentrate in Plant Genetics and Breeding should complete the following courses *in conjunction with* those required for all Plant Science majors:

1. **At least one of the following courses in Plant Biology:**
   - PLBIO 3430 (Molecular Biology and Genetic Engineering of Plants) or
   - PLBIO 4620 (Plant Biochemistry) or PLBIO 4440 (Plant Cell Biology)
2. PLBRG 2250 (Plant Genetics)*
3. PLBRG 4030 (Genetic Improvement of Crop Plants)
4. **Two courses on Plant-Pest Interactions:**
   - PLPPM 3010 (Biology and Management of Plant Diseases) *and* one other course listed in the plant-pest/plant interactions category of the “Course Requirements” sheet.
   (Requirements for the major include only one plant-pest interaction course. Students in the Plant Genetics and Breeding concentration *must* take two.)
5. **At least one of the following courses:**
   - BIOEE 1780 (Evolutionary Biology and Diversity) or
   - PLBIO 2430 (Taxonomy of Cultivated Plants) or PLBIO 4470 (Molecular Systematics)
6. *Students intending to go to graduate school in plant breeding are strongly encouraged to take BIOMG 2800 (Genetics and Genomics).*

III. **Plants and Human Health Concentration**

Students who choose to concentrate in Plants and Health should complete the following courses *in conjunction with* those required for all Plant Science majors:

1. PLBIO 2210 (Natural Remedies and Ethnohealth)
2. PLBIO 3800 (Strategies and Methods in Drug Discovery)
3. ANTHR 2468 (Medicine, Culture, and Society)
4. CHEM 1570 (Introduction to Organic and Biological Chemistry) or CHEM 3570 (Organic Chemistry for the Life Sciences) or BIOMG 3310 (Principles of Biochemistry: Proteins and metabolism)
5. BIOG 1500 (Investigative Biology laboratory)
6. BIOG 1440 (Introduction to Comparative Physiology)

In addition, students in Plants and Health are encouraged, **but not required**, to take:

- BIONB 3920 (Drugs and the Brain)
- PLPPM 3290 (Medical and Veterinary Mycology)
- PLBIO 2470 (Plants and People)
- VTMED 6531 (Poisonous Plants)
- PLHRT 2350 (Food, Fiber and Fulfillment: Plants and Human Well-Being)

IV. **Plant Physiology and Molecular Biology Concentration**

Students who choose to concentrate in Plant Physiology and Plant Molecular Biology should complete the following courses *in conjunction with* those required for all Plant Science majors:

1. CHEM 2070-2080 (General Chemistry). One full year of general chemistry,
2. CHEM 1570 (Introduction to Organic and Biological Chemistry) or CHEM 3570 (Organic Chemistry for the Life Sciences)
3. BIOG 1440 (Introduction to Comparative Physiology)
4. PLBIO 3420/3421 (Plant Physiology Lecture/Laboratory).
   - Note that PLBIO 2420/2421 is *not an option* for the PPPMB concentration.
5. PLPPM 3010 (Biology and Management of Plant Diseases)
   - Note that Plant Science majors are required to take one course in Plant-Pest/Plant-Plant Interaction. Requiring students in the PPPMB concentration to take this course focuses, but does not raise, the number of required courses.
In addition, students in the plant physiology concentration must take at least one of the following courses:

- PLBIO 4220 (Plant Development) **genetics and biochemistry prerequisites
- PLBIO 4440 (Plant Cell Biology) **genetics and biochemistry prerequisites
- PLBIO 4620 (Plant Biochemistry) **biochemistry prerequisite
- PLBIO 4831 (Concepts and Techniques in Plant Molecular Biology) **genetics and biochemistry prerequisites
- PLBIO 6420 (Mineral Nutrition: From Plants to Humans) **biochemistry prerequisite.
- PLSCS 4130 (Physiology and Ecology of Yield) **plant physiology, biochemistry, or molecular biology prerequisites **
- PLHRT 4250/4251 (Postharvest Biology of Horticultural Crops, Lecture/Lab) **Note that several courses on the list have prerequisites not normally taken by PS students.

V. Sustainable Plant Production and Landscape Management

This concentration allows students to gain expertise in the theory and practice of growing plants (fruits, vegetables and landscape plants) and their sustainable management in various landscape or greenhouse environments.

1. PLHRT 1101 (4 credits, fall)
2. Two courses from the list below (includes the 3 credits already required for the major):
   - PLSCS 3150: Weed Biology and Management (4 credits, fall)
   - ENTOM 2120: Insect Biology (4 credits, fall)
   - ENTOM 4440/PLSCS 4440: Integrated Pest Management (4 credits, spring)
   - PLPPM 3010: Biology and Management of Plant Diseases (4 credits, fall)
3. One class from the list below:
   - PLHRT 3910 or 3920: Woody Plant Identification and Use (2 credits each, fall and spring)
   - PLHRT 4910 and 4920: Creating the Urban Eden. Incorporates the woody plant identification part of PLHRT 3910 and 3920 but includes landscape design and establishment techniques (4 credits each, fall and spring)
   - PLHRT 3000: Annual and Perennial Plant Identification and Use (3 credits, fall – even years)
4. PLHRT 4000 (3 credits, spring)
5. Students in Sustainable Plant Production and Landscape Management must also complete an advisor-approved internship related to the concentration. Variable credits 1-3, S/U grade only. See below for links to important information on PS internships.

Suggested minors within CALS, in lieu of one of the concentrations described above, include but are not limited to:

- Education: [http://education.cornell.edu/undergrad.html](http://education.cornell.edu/undergrad.html)
- Entomology: [http://entomology.cals.cornell.edu/undergraduate/courses/requirements-minor-entomology](http://entomology.cals.cornell.edu/undergraduate/courses/requirements-minor-entomology)
- Natural resources: [http://dnr.cals.cornell.edu/undergraduate/minor-requirements](http://dnr.cals.cornell.edu/undergraduate/minor-requirements)
- International Studies: [http://ip.cals.cornell.edu/undergrad/minor.cfm](http://ip.cals.cornell.edu/undergrad/minor.cfm)

Other minors in CALS may also be used to satisfy this requirement, although minors in any of the Plant Science sections (e.g., PLHRTiculture) are not acceptable options. For a complete list of minors in CALS, see [http://cals.cornell.edu/admissions/academics/minors/](http://cals.cornell.edu/admissions/academics/minors/). For information on internships in the Plant Science program, visit [http://blogs.cornell.edu/PLHRTinternships/](http://blogs.cornell.edu/PLHRTinternships/).