

# INTEGRATIVE PLANT SCIENCE (MPS)

Graduate School

Program Website (<https://cals.cornell.edu/school-integrative-plant-science/degrees-programs/integrative-plant-science-mps-degree/>)

CIP: 01.1101 | HEGIS: 0108.00 | NYSED: 42517

## Graduate Field

Integrative Plant Science (<https://catalog.cornell.edu/graduate-school/integrative-plant-science/>)

## Program Description

The Master of Professional Studies in Integrative Plant Science is a one-year, STEM-designated, course-based master's degree program ideal for career-focused students. Students engage with foremost experts in plant and agricultural sciences while exploring one of our fourteen concentrations, which examine fundamental and applied aspects of plants, soils, microbes, and their interactions within natural and managed ecosystems.

A hallmark of the MPS program is the balanced portfolio of technical knowledge, analytical skills, and professional development built into the curriculum, designed to equip students with the skill set and knowledge necessary for careers in industry, government, or non-profit agencies.

## Concentrations

- Agronomy
- Cannabis science
- Climate change and agriculture
- Controlled environment agriculture
- Crop science
- Geospatial applications
- Hemp science
- Plant biotechnology
- Plant breeding
- Plant protection
- Plant systems
- Public garden leadership
- Soil science
- Viticulture

## Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 30

## Program Requirements

### College-specific requirements

- 30 credits in graduate-level courses at least 20 of which must be taken in the College of Agriculture and Life Sciences.
- Capstone project: 2 to 6 credits of the required 30 credits.

- Enrollment in a minimum of 12 credits each semester. It is advised that students enroll in 15 credits each semester to stay on track for this one-year program.
- Additional requirements:
  - A minimum cumulative grade point average of 2.5
  - A minimum of 18 letter-graded credits
  - Completion of the degree within 1 year from admission date

## Field-specific requirements

Code	Title	Hours
<b>Core Courses (all concentrations): 13 credit minimum</b>		<b>13</b>
<i>Professional Development: 5 credit minimum</i>		
Required Courses		
PLSCI 5050	Cultivating Community through Self-discovery and Skill Development	2
Select from the following:		
AEM 5700	MPS Management Communication	1.5
AEM 6145	Business and Management Fundamentals for STEM Graduate Students	1.5
ALS 5211	Career Readiness: Engaged Learning for CALS Professional Master's Students	1
HADM 6130	Entrepreneurial Management	3
NBA 5070	Entrepreneurship for Scientists and Engineers	3
NBA 5640	The Business of Entrepreneurship	3
NBA 5670	Management Writing	1.5
NBA 5680	Management Presentations	1.5
NBA 5690	Management Consulting Essentials	1.5
NBA 6230	Actualizing Your Startup - Part I	1.5
NCC 5540	Managing and Leading in Organizations	3
PUBPOL 5431	Fundraising, Grantmaking, and Lobbying	1.5
<i>Project: 2 – 6 credit maximum</i>		
Required Courses		
ALS 5900	Project Development: CALS Professional Master's Programs	1-5
ALS 5910	Project Completion: CALS Professional Master's Programs	1
<i>Quantitative Literacy: 2 credit minimum</i>		<b>2</b>
Select one of the following:		
AEM 5225	Systems and Analytics in Accounting	3
AEM 5510	Environmental Economics	3
AEM 5605	Predictive Analytics for Business Strategy	3
BTRY 5010	Statistics I	4
BTRY 5090	Theory of Statistics	4
BTRY 6010	Statistical Methods I	4
CEE 5980	Decision Framing and Analytics	3
COMM 6820	Quantitative Research Methods	3
DEA 6560	Research Methods in Social Sciences	4
GDEV 6190	Quantitative Research Methods	4
GOVT 6019	Introduction to Probability and Applied Statistics	4
ILRST 6100	Statistical Methods I	4
SOC 6010	Statistics for Sociological Research	4
SOC 6310	Qualitative Research Methods for Studying Science, Technology, and Medicine	3
STSCI 5120	R Programming for Data Science	2

STSCI 5150	Introductory Statistics for Biology	4
STSCI 5200	Statistics I	4

**Concentration Requirements**

*In addition to the core courses, students must complete 12 additional credits in one of twelve concentrations:*

Agronomy
Climate Change and Agriculture
Controlled Environment Agriculture
Crop Science
Geospatial
Plant Biotechnology
Plant Breeding
Plant Protection
Plant Systems
Public Garden Leadership
Soil Science
Viticulture

**Concentrations****Agronomy**

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from category A</b>		

<i>Category A</i>		
PLSCI 5110	Field Crop Systems	4
PLSCI 5150	Weed Biology and Management	4
PLSCI 5210	Soil and Crop Management for Sustainability	3
PLSCI 5440	Integrated Pest Management	4

<i>Category B</i>		
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5140	Global Cropping Systems and Sustainable Development	3
PLSCI 5200	Geographic Information Systems (GIS): Concepts and Application	3
PLSCI 5290	Remote Sensing and Modeling for Ecosystems	3
PLSCI 5600	Soil Science	4
PLSCI 5660	Soil Ecology	3-4
PLSCI 5800	Principles and Practices in Certified Organic Agriculture	3
PLSCI 6551	Principles of Nutrition and Nutrient Management in Crops and Landscape Plants	3
PLSCI 6710	Soil Chemistry	3

**Climate Change and Agriculture**

Code	Title	Hours
<b>12 credit minimum</b>		
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5140	Global Cropping Systems and Sustainable Development	3
PLSCI 5200	Geographic Information Systems (GIS): Concepts and Application	3
PLSCI 5210	Soil and Crop Management for Sustainability	3
PLSCI 5290	Remote Sensing and Modeling for Ecosystems	3
PLSCI 5440	Integrated Pest Management	4
PLSCI 6030	Genetic Improvement of Crop Plants	3

PLSCI 6080	Methods of Plant Breeding Laboratory	2
PLSCI 6200		
PLSCI 6250	Data-Model Fusion in Research	3
PLSCI 6450	Urban Plants and Public Health	3

**Controlled Environment Agriculture**

Code	Title	Hours
<b>12 credit minimum of category A and B to include required course</b>		

<i>Category A</i>		
PLSCI 5025	Hydroponic Food Crop Production and Management	4

<i>Category B</i>		
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5045	Chemistry and Pharmacology of Cannabis	1
PLSCI 5175	Production and Management of Greenhouse Crops	4
PLSCI 5420	Plant Physiology, Lectures	3
PLSCI 6020	Plant Propagation	3
PLSCI 6070	Nutritional Quality Improvement of Food Crops	2
PLSCI 6080	Methods of Plant Breeding Laboratory	2
PLSCI 6095	Practicum in Plant Breeding	1-3
PLSCI 6100	Plant Responses to Environmental Stresses and Global Climate Change	3
PLSCI 6550	Postharvest Biology of Horticultural Crops	3
PLSCI 6551	Principles of Nutrition and Nutrient Management in Crops and Landscape Plants	3

**Crop Science**

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from Category A</b>		

<i>Category A</i>		
PLSCI 5110	Field Crop Systems	4
PLSCI 5140	Global Cropping Systems and Sustainable Development	3
PLSCI 5150	Weed Biology and Management	4
PLSCI 5210	Soil and Crop Management for Sustainability	3
PLSCI 5440	Integrated Pest Management	4

<i>Category B</i>		
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5290	Remote Sensing and Modeling for Ecosystems	3
PLSCI 5430	Molecular Biology and Genetic Engineering of Plants	2
PLSCI 5600	Soil Science	4
PLSCI 5660	Soil Ecology	3-4
PLSCI 5800	Principles and Practices in Certified Organic Agriculture	3
PLSCI 6030	Genetic Improvement of Crop Plants	3

**Geospatial**

Code	Title	Hours
<b>12 credit minimum</b>		
BIOEE 6550	Data Analysis and Visualization in Ecology and Environmental Science	3
CRP 5080	Introduction to GIS for Planners	4

CRP 5250	Methods for Spatial Economic and Demographic Analysis	4
CRP 5530	Land Use and Spatial Planning Methods	4
CRP 5680	Introduction to Urban Data Science: Data, Interpretation, and Presentation	4
EAS 6540	Ocean Satellite Remote Sensing	3
NTRES 6260	Applied Conservation Ecology	3
PLSCI 5140	Global Cropping Systems and Sustainable Development	3
PLSCI 5200	Geographic Information Systems (GIS): Concepts and Application	3
PLSCI 5290	Remote Sensing and Modeling for Ecosystems	3
PLSCI 6200		
PLSCI 6250	Data-Model Fusion in Research	3
PUBPOL 6950	Spatial Demography	3
VTPEH 6175	Introduction to GIS for Public Health	3

### Plant Biotechnology

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from Category A</b>		<b>12</b>
<i>Category A</i>		<b>5</b>
PLSCI 5420	Plant Physiology, Lectures	3
PLSCI 5430	Molecular Biology and Genetic Engineering of Plants	2
PLSCI 5431	Laboratory in Molecular Biology and Genetic Engineering of Plants	2
PLSCI 6000	Concepts and Techniques in Computational Biology	4
PLSCI 6020	Plant Propagation	3
PLSCI 6030	Genetic Improvement of Crop Plants	3
PLSCI 6410	Laboratory in Plant Biology	2
PLSCI 6831	Concepts and Techniques in Plant Biology	3
PLSCI 6880	Genetic Engineering of Food Crops: Myths, Truths and Detection	1
<i>Category B</i>		
PLSCI 5440	Integrated Pest Management	4
PLSCI 6080	Methods of Plant Breeding Laboratory	2
PLSCI 6230	Equitable Crop Improvement: From Theory to Practice	3
PLSCI 6540	Plant Cell Biology	4
PLSCI 6620	Plant Biochemistry	3
PLSCI 6841	Plant Form and Function: Anatomy, Cell Biology, and Development	3

### Plant Breeding

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from Category A</b>		<b>12</b>
<i>Category A</i>		<b>5</b>
PLSCI 5420	Plant Physiology, Lectures	3
PLSCI 6020	Plant Propagation	3
PLSCI 6030	Genetic Improvement of Crop Plants	3
PLSCI 6080	Methods of Plant Breeding Laboratory	2
PLSCI 6095	Practicum in Plant Breeding	1-3

PLSCI 6230	Equitable Crop Improvement: From Theory to Practice	3
PLSCI 6831	Concepts and Techniques in Plant Biology	3
PLSCI 6841	Plant Form and Function: Anatomy, Cell Biology, and Development	3
<i>Category B</i>		
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5110	Field Crop Systems	4
PLSCI 5430	Molecular Biology and Genetic Engineering of Plants	2
PLSCI 5440	Integrated Pest Management	4
PLSCI 6070	Nutritional Quality Improvement of Food Crops	2
PLSCI 6100	Plant Responses to Environmental Stresses and Global Climate Change	3
PLSCI 6620	Plant Biochemistry	3
PLSCI 7420	Genotypes to Phenotypes: The Evolution of Genetic Modeling in Plant Breeding	1.5

### Plant Protection

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from Category A</b>		<b>12</b>
<i>Category A</i>		<b>5</b>
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5150	Weed Biology and Management	4
PLSCI 5440	Integrated Pest Management	4
PLSCI 6010	Molecular Biology of Plant-Microbe Interactions	3
PLSCI 6610	Diagnostic Lab Experience	1-2
<i>Category B</i>		
PLSCI 5110	Field Crop Systems	4
PLSCI 5290	Remote Sensing and Modeling for Ecosystems	3
PLSCI 5800	Principles and Practices in Certified Organic Agriculture	3
PLSCI 6100	Plant Responses to Environmental Stresses and Global Climate Change	3

### Plant Systems

Code	Title	Hours
<b>12 credit minimum</b>		<b>12</b>
LA 5910	Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment	5
PUBPOL 5410	Nonprofit Management and Finance	3
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5025	Hydroponic Food Crop Production and Management	4
PLSCI 5045	Chemistry and Pharmacology of Cannabis	1
PLSCI 5110	Field Crop Systems	4
PLSCI 5140	Global Cropping Systems and Sustainable Development	3
PLSCI 5150	Weed Biology and Management	4
PLSCI 5200	Geographic Information Systems (GIS): Concepts and Application	3
PLSCI 5210	Soil and Crop Management for Sustainability	3
PLSCI 5290	Remote Sensing and Modeling for Ecosystems	3

PLSCI 5430	Molecular Biology and Genetic Engineering of Plants	2
PLSCI 5431	Laboratory in Molecular Biology and Genetic Engineering of Plants	2
PLSCI 5440	Integrated Pest Management	4
PLSCI 5660	Soil Ecology	3-4
PLSCI 5825	Museum and Park Interpretation	3
PLSCI 5850	Public Garden Management	3
PLSCI 6010	Molecular Biology of Plant-Microbe Interactions	3
PLSCI 6020	Plant Propagation	3
PLSCI 6030	Genetic Improvement of Crop Plants	3
PLSCI 6070	Nutritional Quality Improvement of Food Crops	2
PLSCI 6080	Methods of Plant Breeding Laboratory	2
PLSCI 6200		
PLSCI 6410	Laboratory in Plant Biology	2
PLSCI 6450	Urban Plants and Public Health	3
PLSCI 6831	Concepts and Techniques in Plant Biology	3
VIEN 5204	Principles and Practices of Growing Grapes and Making Wines	3
VIEN 5205	Growing Grapes and Making Wines Graduate Laboratory	2
VIEN 5300	The Science of Grapevines	2
VIEN 5400	Wine and Grapes: Composition and Analysis	2
VIEN 5500	Advanced Winemaking Theory and Practice I	2
VIEN 5610	Vineyard Management I	2
VIEN 6700	Advanced Winemaking Theory and Practice II	2

### Public Garden Leadership

Code	Title	Hours
<b>12 credit minimum</b>		<b>12</b>
CRP 5072	Land Use, Environmental Planning, and Urban Design Workshop	4
EDUC 5350	Youth Organizations and Leadership Development	3
EDUC 5510	Engaged Learning Through Extension, Outreach, and Instruction	3
LA 5910	Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment	5
PLSCI 5010	Biology and Management of Plant Diseases	4
PLSCI 5825	Museum and Park Interpretation	3
PLSCI 5850	Public Garden Management	3
PLSCI 6020	Plant Propagation	3
PLSCI 6450	Urban Plants and Public Health	3

### Soil Science

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from Category A</b>		<b>12</b>
<i>Category A</i>		<b>5</b>
PLSCI 5200	Geographic Information Systems (GIS): Concepts and Application	3
PLSCI 5210	Soil and Crop Management for Sustainability	3
PLSCI 5600	Soil Science	4
PLSCI 5660	Soil Ecology	3-4
PLSCI 6200		
<i>Category B</i>		

PLSCI 5140	Global Cropping Systems and Sustainable Development	3
PLSCI 5800	Principles and Practices in Certified Organic Agriculture	3
PLSCI 6250	Data-Model Fusion in Research	3
PLSCI 6710	Soil Chemistry	3

### Viticulture

Code	Title	Hours
<b>12 credit minimum of category A and B with at least 5 credits from Category A</b>		<b>12</b>
<i>Category A</i>		<b>5</b>
VIEN 5204	Principles and Practices of Growing Grapes and Making Wines	3
VIEN 5205	Growing Grapes and Making Wines Graduate Laboratory	2
VIEN 5400	Wine and Grapes: Composition and Analysis	2
VIEN 5500	Advanced Winemaking Theory and Practice I	2
VIEN 5610	Vineyard Management I	2
VIEN 6700	Advanced Winemaking Theory and Practice II	2
<i>Category B</i>		
PLSCI 5440	Integrated Pest Management	4
PLSCI 5600	Soil Science	4
PLSCI 5800	Principles and Practices in Certified Organic Agriculture	3
VIEN 5510	Advanced Winemaking Theory and Practice I Laboratory	2

## University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

### Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (<https://registrar.cornell.edu/service-resources/college-registrar-directory/>) for more information.

### Non-academic Requirements

**Conduct Matters.** Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

**Financial Obligations.** Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.

## Learning Outcomes

- Describe plant biology at genetic, molecular, physiological, and organismal levels to integrate plant functionalities in a hierarchical manner, from individual cells to the biosphere.
- Apply major concepts and principles from multiple areas of life science to create plant-related solutions to problems such as access to food, agriculture in a changing climate, and pest challenges.
- Contribute to the application of the plant science knowledge base toward critical problems in national and worldwide industries and economies.
- Formulate original questions about plants into empirically testable hypotheses, collect and analyze data obtained from original research, and apply experimental data to advance the field and solve real-world problems.
- Discuss natural and managed ecosystems at local, regional, and global levels and evaluate their effects on environmental sustainability and human health and well-being.
- Demonstrate an awareness of the ethical principles and global consequences associated with past, present and future advances in plant science, demonstrate an appreciation for the range of cultures, values and perspectives of living in a global community, and engage in actions that reflect civic responsibility.
- Identify suitable career paths requiring skills of plant science and communicate information about the breadth of issues in plant science to diverse audiences in oral and written formats.
- Deliver a high quality problem-solving capstone project such as an action project, the development of a plan to address a pertinent problem, the development of novel outreach materials or methodologies, or the development, execution, or analysis of research data appropriate to the profession.