AGRICULTURAL SCIENCE AND TECHNOLOGY MAJOR

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Agricultural Science and Technology is an interdisciplinary major focusing on sustainable production of food, feed, fiber, fuel, and ornamentals as well as developing skills to provide agricultural education for all. This major is a science-based curriculum that allows students to obtain technological skills while developing critical thinking in a broad area of agricultural studies. There are three specializations to choose from in this major: Agronomy, Environmental Horticulture (fruit, vegetable and ornamental production outdoors and in controlled environment and hydroponic systems), and Agricultural and Extension Education.

Agronomy

Agronomy students will focus on a broad range of agricultural disciplines providing them with a comprehensive education in crop, soil and animal sciences. Students will take courses in animal science, crop science, soil science, agricultural economics and plant protection. This specialization has electives that allows students to design their curriculum and develop knowledge in areas that meet their future goals. Graduates will be prepared to work in the agricultural industry in agricultural extension, management, marketing, regulatory, support services, as well as other opportunities.

Environmental Horticulture

The Environmental Horticulture specialization focuses on the science, technology and management of sustainable fruit, vegetable, flower and woody ornamental plant production as well as controlled environment agriculture and hydroponic crop production. Applied aspects of the curriculum include training in plant propagation, plant identification, field production of fruits, vegetables and ornamental crops, greenhouse crop production, containerized nursery production, and food production in controlled environment and hydroponic systems. Courses are taken in plant science, soil science, plant pathology and entomology, plant protection and food safety. Graduates of this program pursue careers in production horticulture, urban agriculture, food safety and public education programs. Some own their own businesses. Students can prepare for plant science graduate programs by taking additional courses.

Agricultural and Extension Education

The Agricultural and Extension Education specialization provides students with varying coursework in agribusiness & communications; animal, food & plant sciences; biotechnology; environmental & natural resources; leadership, youth & career development; power, structural & technical systems; and foundational pedagogical education courses. Students practice agricultural literacy techniques throughout their individualized learning experiences to develop mastery in educating using agricultural concepts with diverse audiences. Inclusion within the Terrapin Teachers program provides cross-disciplinary and interdisciplinary opportunities for learning with peers.

Graduates focused on formal education may become certified secondary high school agricultural teachers in public or private schools or specialize in an area for career technical education. Those focused as agricultural advocates may seek non-formal education jobs in non-profit agricultural literacy based foundations, become Extension youth educators, Extension agricultural specialists, or work within agricultural industry public relations areas. Proximity to federal agencies provides students with an opportunity to expand their international and regulation agency networking skills.

Undergraduates have two options.

1. The first option is to complete a double major in 4 years*: (1) Agricultural Science and Technology, Agricultural and Extension Education specialization and (2) Secondary Sciences Education. Graduates of this option are eligible to obtain teacher certification.

   *With Junior status, students could opt to enroll in the Integrated Master Certificate Program (IMCP) and complete a Curriculum and Instruction, Master of Education (M.Ed.) with Certification in the 5th year. These students are able to complete additional agricultural content courses due to the majority of their educational courses being completed in the 30 credit master's program.
2. The second option is to major in Agricultural Science and Technology, Agricultural and Extension Education specialization with no teacher certification and focus on Extension/Industry internships. Students graduating from this option could apply at a later date to complete a master's degree through the Curriculum and Instruction, Master of Education (M.Ed.) with the teacher certification (MCERT) program.

Program Learning Outcomes

1. Students will develop technical and knowledge-based skills in the required areas of study.
2. Students will use technical and basic learned knowledge to collaborate, solve problems, and then articulate conclusions.
3. Students shall develop effective communication skills and demonstrate the ability to present ideas with clarity to an appropriate audience.
4. Students will connect and build relationships with external groups in the appropriate fields of study.

REQUIREMENTS

Grading Policy: Students in the Agricultural Science & Technology program are required to earn grades of "C-" or higher in all required courses including courses used to satisfy elective requirements.

Course	Title	Credits
Major Core Courses		
Foundational Science Courses		**7-8**
CHEM131 & CHEM132	Chemistry I - Fundamentals of General Chemistry and General Chemistry I Laboratory	
Select one of the following:		
CHEM231 & CHEM232	Organic Chemistry I and Organic Chemistry Laboratory I	
or PLSC275		
Foundational Agricultural Courses		
PLSC201	Plant Structure and Function	3

PLSC206	Plant Structure and Function Laboratory	1
ENST200	Fundamentals of Soil Science	4
Plant Protection Courses		
BSCI337	Biology of Insects	4
or BSCI487	IPM: Science-Based Decision Making for Sustainable Pest Management	
or BSCI497	Insect Pests of Ornamentals and Turf	
PLSC420	Principles of Plant Pathology	4
PLSC453	Weed Science	3
Specialization Requirements		**54-75**
Select one of the following specializations:		
Agronomy		
Environmental Horticulture		
Agricultural and Extension Education		
Total Credits		**80-102**

Specializations: Agronomy

Course	Title	Credits
Agronomy Specialization Requirements		
Mathematics Course		
MATH115	Precalculus	3
Biology, agronomy and animal science courses		
BSCI160 & BSCI161	Principles of Ecology and Evolution and Principles of Ecology and Evolution Lab	4
PLSC112 & PLSC113	Introductory Crop Science and Introductory Crop Science Laboratory	4
ANSC101 & ANSC103	Principles of Animal Science and Principles of Animal Science Laboratory	4
AGST400	Advanced Crop Science	3
AGST401	Tractor and Equipment Operation, Safety and Maintenance	1
AREC306	Farm Management and Sustainable Food Production	3
Animal Management Course (select one)		**3**
ANSC220	Livestock Management	
ANSC232	Horse Management	
ANSC242	Dairy Cattle Management	
ANSC245	Sheep Management	
ANSC255	Introduction to Aquaculture	
ANSC262	Commercial Poultry Management	
ANSC282	Grazing Animal Management	
Upper level (greater or equal to 300) restricted electives		
AGST, PLSC or ANSC Restricted Elective [1,2]		3
AREC or BMGT Restricted Elective [1,3]		3
AGST or PLSC Restricted Elective [1,4]		3
AGST or PLSC Restricted Elective [1,4]		3
AGST or PLSC Restricted Elective [1,4]		3
ENST Restricted Elective [1,5]		3
Multidiscipline Restricted Elective (Course is restricted to Education, Computer Application or Policy.) [1,6]		3
Internship and capstone courses		
PLSC389	Internship	3
PLSC460	Application of Knowledge in Plant Sciences	3
General Electives		**6**
Total Credits		**58**

1 This course will be chosen in consultation with the academic advisor.
2 This course is restricted to 300-level or above courses within the Department of Animal and Avian Sciences.
3 This course is restricted to 300-level or above courses with the Department of Agricultural and Resource Economics or the Robert H. Smith School of Business.
4 This course is restricted to 300-level or above courses within the Agricultural Science and Technology program or the Plant Science program.
5 This course is restricted to 300 level or above courses within the Department of Environmental Science and Technology.
6 This course is restricted to Education, Computer Science or Policy.

Environmental Horticulture

Course	Title	Credits
Environmental Horticulture Specialization Requirements		
Mathematics Course		
MATH115	Precalculus	3
Economics Course		**3**
Select one of the following:		
AREC250	Elements of Agricultural and Resource Economics	
or ECON200	Principles of Microeconomics	
Introductory Course		**3-4**
Select one of the following:		
ANSC101 & ANSC103	Principles of Animal Science and Principles of Animal Science Laboratory	
BMGT110	Introduction to the Business Value Chain	
BMGT160	The Intentional Self	
BSCI126	Pollinators in Crisis	
GEOG110	The World Today: Global Perspectives	
or GEOG330	As the World Turns: Society and Sustainability in a Time of Great Change	
GEOL120	Environmental Geology	
INAG250	Fundamentals of Agricultural Mechanics	
LARC151	Urban Agriculture: Designing and Assessing Edible Landscapes	
LARC152	Greening Cities: Who Wins, Who Loses, and Who Cares?	
LARC160	Introduction to Landscape Architecture and Environmental Design	
LARC162	Environmental Justice: Same World, Different Built Environment	
SPAN103	Elementary Spanish for Intercultural Communication I	
Biological Sciences		**4**
Complete the following courses:		
BSCI170 & BSCI171	Principles of Molecular & Cellular Biology and Principles of Molecular & Cellular Biology Laboratory	
Foundational Horticulture Courses		**7**
Complete all listed courses		

PLSC110 & PLSC111	Introduction to Horticulture and Introduction to Horticulture Laboratory	
PLSC271	Plant Propagation	
Lower level (greater or equal to 100) restricted electives		**6-8**
Select two of the following courses:		
AGST130	Did Yeast Create Civilization?	
PLSC125	Feeding Ten Billion by 2050: Food Security and Crop Protection	
PLSC203	Plants, Genes and Biotechnology	
PLSC205	Introduction to Turf Science and Management	
PLSC226	Plant Diversity	
PLSC253	Woody Plants for Mid-Atlantic Landscapes I	
PLSC254	Woody Plants for Mid-Atlantic Landscape II	
AOSC200 & AOSC201	Weather and Climate and Weather and Climate Laboratory	
Agriculture Business, Economics, Management or Marketing Course		**3**
Select one of the following:		
AREC306	Farm Management and Sustainable Food Production	
AREC345	Global Poverty and Economic Development	
AREC365	World Hunger, Population, and Food Supplies	
BMGT Restricted Elective [1,2]		
PLSC251	Financial Applications for the Green Industry	
Advanced Horticulture Courses		
Complete all listed courses:		
PLSC432	Greenhouse Crop Production	3
PLSC433	Technology of Fruit and Vegetable Production	4
Upper level (greater or equal to 300) restricted electives		**6-8**
Select two of the following:		
AGST333	Crafty Beverage Crops	
AGST401	Tractor and Equipment Operation, Safety and Maintenance	
ENST411	Principles of Soil Fertility	
LARC461	People and the Environment	
PLSC303	Global Food Systems	
PLSC400	Plant Physiology	
PLSC425	Green Roofs and Urban Sustainability	
PLSC452	Environmental Horticulture	
PLSC461	Cultural Management of Nursery and Greenhouse Systems: Substrates	
PLSC462	Cultural Management of Nursery and Greenhouse Systems; Irrigation	
PLSC464	Cultural Management of Nursery and Greenhouse Systems: Nutrients	
PLSC471	Forest Ecology	
AGST or PLSC Approved Elective [1,3]		
Career Preparation Courses		**6**
PLSC389	Internship [4]	
or PLSC399	Special Problems in Plant Science	
PLSC460	Application of Knowledge in Plant Sciences	
General Electives		**6**
Total Credits		**54-59**

1 This course will be chosen in consultation with the academic advisor.

2 This course is restricted to the 200-level or above.

3 This course is restricted to 300-level or above courses within the Agricultural Science and Technology program or the Plant Sciences program.

4 Requires approval from advisor.

Agricultural and Extension Education: Teaching Certificate

Course	Title	Credits
Agriculture-Related Courses		
Animal Science		
ANSC101 & ANSC103	Principles of Animal Science and Principles of Animal Science Laboratory	4
One of the following animal management courses:		3
ANSC220	Livestock Management	
ANSC232	Horse Management	
ANSC242	Dairy Cattle Management	
ANSC245	Sheep Management	
ANSC255	Introduction to Aquaculture	
ANSC262	Commercial Poultry Management	
ANSC282	Grazing Animal Management	
Agribusiness		
MATH113	College Algebra and Trigonometry	3
AREC250	Elements of Agricultural and Resource Economics	3
Biology		
BSCI160 & BSCI161	Principles of Ecology and Evolution and Principles of Ecology and Evolution Lab	4
Power, Structural & Technical		
INAG250	Fundamentals of Agricultural Mechanics	3
PLSC235		3
or INAG235	Irrigation and Drainage	
Environmental Sciences and Natural Resources		
PLSC471	Forest Ecology (or elective focused on Renewable Energy)	3
Plant Sciences		
PLSC110 & PLSC111	Introduction to Horticulture and Introduction to Horticulture Laboratory	4
or PLSC112 & PLSC113	Introductory Crop Science and Introductory Crop Science Laboratory	
Food Science		
NFSC112	Food: Science and Technology	3
or PLSC115	How Safe is Your Salad? The Microbiological Safety of Fresh produce	
Leadership & Career Development		
AGST440	Exploring Maryland Agriculture, Agricultural Industry, and Agricultural Literacy (Exploring Maryland Agriculture, Agricultural Industries & Agricultural Literacy)	3
AGST442	(Developing Leadership in Youth and Volunteers)	3
EDHD426	Cognitive and Motivational Literacy Content	3
Education Pre-Professional		
TLPL101	Inquiry Approach to Teaching STEM (Step 1)	1
TLPL102	Inquiry Teaching of STEM in Middle School	2

One of the following courses:		3
TLPL401	Student-Centered Curriculum and Instruction	
TLPL488	Special Topics in Education (TLPL488P: Project Based Instruction)	
TLPL414	Knowing and Learning in Mathematics and Science	3
Teacher Certification		
Professional Courses		
TLPL415	Perspectives in Science	3
TLPL425 or AGST425	Learning and Teaching in Science	3
TLPL481	Embracing Diversity in the Classroom Community	3
Student Teaching		
TLPL478	Professional Seminar in Education (TLPL478F: Professional Seminar in Education: Agriculture)	2
TLPL479	Field Experiences in Education (TLPL479F: Field Experience in Science Education)	1
TLPL489	Internship in Education (TLPL489F)	12
Total Credits		**75**

Agricultural and Extension education: Extension/Industry

Course	Title	Credits
Agriculture-Related Courses		
Animal Science		
ANSC101 & ANSC103	Principles of Animal Science and Principles of Animal Science Laboratory	4
One of the following animal management courses:		3
ANSC220	Livestock Management	
ANSC232	Horse Management	
ANSC242	Dairy Cattle Management	
ANSC245	Sheep Management	
ANSC262	Commercial Poultry Management	
ANSC282	Grazing Animal Management	
Agribusiness		
MATH113	College Algebra and Trigonometry	3
AREC250	Elements of Agricultural and Resource Economics	3
Biology		
BSCI160 & BSCI161	Principles of Ecology and Evolution and Principles of Ecology and Evolution Lab	4
Power, Structural & Technical		
INAG250	Fundamentals of Agricultural Mechanics	3
PLSC235 or INAG235	Irrigation and Drainage	3
Environmental Sciences and Natural Resources		
PLSC471	Forest Ecology (or elective focused on Renewable Energy)	3
Plant Sciences		
PLSC110 & PLSC111	Introduction to Horticulture and Introduction to Horticulture Laboratory	4
or PLSC112 & PLSC113	Introductory Crop Science and Introductory Crop Science Laboratory	
Food Science		
NFSC112 or PLSC115	Food: Science and Technology How Safe is Your Salad? The Microbiological Safety of Fresh produce	3
Leadership & Career Development		
AGST442	(Developing Leadership in Youth and Volunteers)	3
AGST440	Exploring Maryland Agriculture, Agricultural Industry, and Agricultural Literacy (Exploring Maryland Agriculture, Agricultural Industries & Agricultural Literacy)	3
Education Pre-Professional		
TLPL101	Inquiry Approach to Teaching STEM (Step 1)	1
TLPL102	Inquiry Teaching of STEM in Middle School	2
One of the following courses:		3
TLPL488	Special Topics in Education (TLPL488P: Project Based Instruction)	
TLPL401	Student-Centered Curriculum and Instruction	
TLPL414	Knowing and Learning in Mathematics and Science	3
Industry/Extension		
Agricultural Expanded		
ANSC255	Introduction to Aquaculture	3
BSCI121		2
INAG252	Agricultural Public Relations	3
AREC/PLSC/LARC Restricted Elective		**6**
AREC/PLSC/LARC: Restricted Elective		
AGST Internship or Elective [1]		**6**
AGST489	Special Topics in Agricultural Science and Technology (Internship)	3
AGST489	Special Topics in Agricultural Science and Technology (Internship or Elective Course)	3
Total Credits		**74**

[1] Internship requirement: Students will either do two internships for a total of 6 credits or one internship for 3 credits and take a different elective course for 3 credits.

GRADUATION PLANS

Click here (https://agnr.umd.edu/academics/advising/four-year-plans/) for roadmaps for graduation plans in the College of Agricultural and Natural Resources.

Additional information on developing a graduation plan can be found on the following pages:

- http://4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/#success) section of this catalog

ADVISING

The department has mandatory faculty advising for each of its major and minor programs. Students are required to meet with their faculty advisor at least twice a year.

For additional information please see:

Concentration	Faculty Advisor
Agricultural and Extension Education	Dr. Melissa Leiden Welsh, Director and Assistant Clinical Professor, Agricultural and Extension Education Advisor, drmwelsh@umd.edu
Agronomy	Dr. Melissa Leiden Welsh, Director and Assistant Clinical Professor, Agronomy Advisor, drmwelsh@umd.edu
Environmental Horticulture	Dr. Diana Cochran, Assistant Clinical Professor, Environmental Horticulture Advisor, cochrand@umd.edu
General Questions	Diana Cortez, Faculty Specialist, dcortez@umd.edu

OPPORTUNITIES

Undergraduate Research Experiences

Students are encouraged to take part in faculty mentored research. Please contact an advisor for more information.

Internships

Internships are a part of the required curriculum and can be in private or government sector employment. Formal (K-12 schools) and non-formal (non-profits, industry & Extension) education settings are available for students in the Agricultural & Extension Education specialization.

Student Clubs and Professional Organizations

Faculty in the department advise student clubs. The department also sponsors student teams that participate in regional and national contests. These teams participate in competitions in the following areas: turf and crop science.

Scholarships and Financial Assistance

Several scholarships and awards are available to AGST students. Contact the Associate Dean's office at 301-405-2078 for additional information. The Department also maintains a listing of scholarships. For more information regarding these scholarships contact the Chair's office in 2104A Plant Sciences, 301-405-4356.

The Office of Student Financial Aid (OSFA) administers all types of federal, state and institutional financial assistance programs and, in cooperation with other university offices, participates in the awarding of scholarships to deserving students. For information, visit: http://financialaid.umd.edu.