

# Agriculture Data Science (Certificate)

All areas of agriculture, food, and life science have seen an explosion in data collection, ranging from plant breeders collecting phenotypic information to drones imaging fields to companies accumulating sales information. Professionals in industry, governmental, non-governmental and academics need post-baccalaureate training on how to properly collect, manage and analyze the data and then make appropriate decisions using the data.

Students will be able to take their training in this certificate in many different directions depending on their educational and employment needs. In data mining and predictive modeling, our students look for useful patterns in large data sets that would allow them to understand the past and better predict the future. In artificial intelligence and the related processes of machine learning and deep learning, our students will go several steps further, creating machines and algorithms that not only analyze and understand data, but also take the next logical steps dictated by the data.

This program will combine SAS data management and analysis techniques with computer science and statistical training to allow students to apply the processes of data mining and artificial intelligence to critical agriculture, food and life science issues. This certificate is intended for those students who have completed a BS degree in agriculture, food or life science and need additional training to be able to manage and use data in their fields. This certificate is also intended for those students who have completed a BS degree in computer science, mathematics or statistics and need additional training in how to apply data science techniques to agriculture, food and life science data issues. Students currently enrolled in a graduate program will also be eligible to complete the certificate.

## More Information

Agriculture Data Science Certificate Website (<https://cals.ncsu.edu/psi/ag-data-science-certificate/>)

Distance Website (<https://online-distance.ncsu.edu/program/agriculture-data-science/>)

## Eligibility

To qualify for admission to the Graduate Certificate in Agriculture Data Science, students must have completed a BS degree in the sciences or engineering, including agriculture, biology, computer science, economics, food, genetics, life sciences, mathematics, and statistics.

Students will select one of two tracks depending on their interests and background:

- **Track A:** Students who have completed a BS degree in agriculture, food or life science and need additional training to be able to manage and use big data in their fields.
- **Track B:** Students who have completed a BS degree in computer science, statistics or in engineering other than biological/agricultural/biosystems engineering and need additional training in how to apply data science techniques to agriculture, food and life science data-driven decisions.

Students selecting Track A should have appropriate work experience or course prerequisites from their prior degree. Students selecting Track B should have prior experience with a high level programming language or the appropriate course prerequisites from their previous degree. Considering the number of courses that can be taken for this certificate, it is possible that students may not have all of the appropriate prerequisites for one or more of the courses. In this case, students should select other courses or contact the instructor to determine if the course(s) would be appropriate for them.

Students must have a 3.0 grade point average in their BS degree at the time of application.

## Applicant Information

- **Delivery Method:** On Campus, Distance
- **Entrance Exam:** None
- **Interview Required:** None

## Application Deadlines

Please visit The Graduate School Application Deadlines (<https://grad.ncsu.edu/admissions/deadlines/>) page for more information.

## Plan Requirements

**Certificates are distributed as "Graduate Certificate in Agriculture Data Science" without track specifications.**

Code	Title	Hours
<b>Required Courses</b>		<b>6</b>
ST 525	Statistics and Computing for Agricultural Data Science	
BAE 542	SAS Advanced Analytics to Agriculture, Food and Life Sciences Data	
<b>Track Requirements</b>		<b>6</b>
Select one of the following tracks:		
Track A: Data Science Fundamentals (p. 1)		
Track B: Data Science Applications in Agriculture, Food, Life Science, and Agricultural Economics (p. 2)		
<b>Total Hours</b>		<b>12</b>

## Track A: Data Science Fundamentals

Code	Title	Hours
<b>Select 6 hours of the following courses:</b>		
BAE 555/455	R Coding for Data Management and Analysis	3
BAE 565	Environmental and Agricultural Analytics and Modeling	3
CSC 440	Database Management Systems	3
CSC/ST 442	Introduction to Data Science	3
CSC 505	Design and Analysis Of Algorithms	3
CSC 520	Artificial Intelligence I	3
CSC 530	Computational Methods for Molecular Biology	3
CSC 540	Database Management Concepts and Systems	3
CSC 541	Advanced Data Structures	3
ST 563	Introduction to Statistical Learning	3

ECE 488/588/ PB 488/588	Systems Biology Modeling of Plant Regulation	3
ECE 542	Neural Networks and Deep Learning	3

## Track B: Data Science Applications in Agriculture, Food, Life Science and Agricultural Economics

Code	Title	Hours
<b>Select 6 hours of the following courses:</b>		
AEHS 777	Qualitative Research Methods in the Agricultural Education and Human Sciences	3
AEC 510	Machine Learning Approaches in Biological Sciences	2
ANS/GN 713	Quantitative Genetics and Breeding	3
ANS/CS/FOR 726	Advanced Topics In Quantitative Genetics and Breeding	3
BAE 535	Precision Agriculture Technology	3
BAE 536	GIS Applications in Precision Agriculture	1
CS 714	Crop Physiology: Plant Response to Environment	3
CS/HS/GN 745	Quantitative Genetics In Plant Breeding	1
CS 755	Applied Research Methods and Analysis for Plant Sciences	3
ECG/ST 561	Applied Econometrics I	3
ECG 562	Applied Econometrics II	3
ECG 563	Applied Microeconometrics	3
ECG 590	Special Economics Topics	1-6
ECG/ST 750	Introduction to Econometric Methods	3
ECG/ST 751	Econometric Methods	3
ECG/ST 752	Time Series Econometrics	3
ECG/ST 753	Microeconometrics	3
ECG 766	Computational Methods in Economics and Finance	3
ECG 739	Empirical Methods for Development Economics and Applied Microeconomics	3
ENT/GES 506	Principles of Genetic Pest Management	3
GN 550/450	Conservation Genetics	3
GN/HS/ST 757	Quantitative Genetics Theory and Methods	3
PP/MB 715	Applied Evolutionary Population Genetics	3
SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3