2023
VIRGINIA GOVERNOR'S SCHOOL
FOR
AGRICULTURE

COURSE GUIDE

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AGRICULTURAL, LEADERSHIP,
AND COMMUNITY EDUCATION
VIRGINIA TECH.

CORE COURSES

All students will participate in the core courses offered by the Virginia Governor's School for Agriculture during the first two weeks of the program. These courses help to establish baseline information across many areas of agriculture in the broadest sense and provide cross-disciplinary connections, as well as the Governor's School for Agriculture experience. In some courses students will engage in field-based learning experiences.

Economics is Everywhere! Some Key Concepts to Understanding the Agriculture Economy
Dr. Mike Ellerbrock
Students will learn how economics relates to their everyday lives and the world around them through discussions of economic development, poverty, comparative advantage, financial planning, and the business of doing business.

It's Not Your Grandfather's Farm
Ms. Carolyn McGraw
Introduction to the Animal Sciences is designed to expose students to the broad scope of the animal sciences, ranging from the basics of animal husbandry to cutting edge research involving animals. Emphasis will be placed on the applied biology related to the nutrition, reproduction, genetics, and well-being of domestic animals.

Farm Safety
Dr. Curt Porterfield
The agriculture industry, grouped with forestry, fishing, and hunting, consistently ranks in the top 10 most dangerous jobs in the U.S. The purpose of this course is to provide guidance for safely working in agricultural contexts and awareness of other farm-related hazards.

Communicating in the Scientific World
Instructors TBD
The purpose of the course is to develop skills in written and oral communication in the agricultural sciences. The course will specifically focus on skills in scientific writing, creating brochures, creating scientific posters, and public speaking with and without PowerPoint, and techniques for blogging.

Dive into Dairy!
Dr. Kayla Alward
In 2022, US dairy farmers produced 64% more milk while using 80% fewer animals compared to 1950. How does the US produce more milk with fewer cows? Advancements in animal genetics, management and precision dairy technology are tools that dairy farmers use to improve milk production, animal well-being and sustainability of their farms. This class will provide a basic overview of cow milk production and marketing and will cover trends in production, physiology of lactation, advancements in technology and the shift towards sustainable agriculture. A field trip to the Virginia Tech Dairy Center at Kentland Farm will highlight precision dairy technology. Educational and career opportunities will be explored.

Engineering in Agriculture, Medicine and the Life Sciences
Dr. Dwayne Edwards
This course describes the engineering profession, how it is related to other fields of knowledge, and how it differs from other career paths. The emphasis will be on the current state of the engineering profession, and

particularly on the role engineering plays in Agriculture, Medicine and the Life Sciences. Students will learn about key issues facing the global community in which engineering can play a key role, particularly in the areas of climate change, biotechnology, delivery of health care, environmental quality, and food. This is a team-taught course that will include faculty members and graduate students who will share their experiences, approaches, and tools they use to solve problems of the present and future.

Plant Sciences Introduction: Crop production, the Environment, and the Role of Biotechnology
Dr. Guillaume Pilot
In this course, we will explore the challenges of feeding 9.3 billion people by 2050 and deal with a changing climate. The options include using more and more land or using the agricultural land we have to produce more. To increase food supplies we must develop crop and forage varieties that are tolerant to stress, diseases, pests, weeds, and more efficient in using water and nutrients. Plant breeding relies heavily on biotechnology, including transgenic approaches for some crops. In addition, we must maintain and improve soil and water quality as agriculture intensifies. We will examine the advantages and disadvantages of these approaches with regard to environmental sustainability while exploring the production systems of important staple crops.

The Value of the Library in the Digital Age
Dr. Kiri DeBose and Ms. Kirsten Dean
It is estimated that our human knowledge (everything we know) is doubling every year, and doubling at an increasing rate. In this age of vast digital information, the library still stands as a mainstay of credible and scholarly evidence to be used to support our opinions. This course will provide techniques and strategies to use the library in today's digital environment. Topics include finding and evaluating sources, exploring databases, and responsible research practices.

MAJOR COURSES

Students will select a major area prior to arriving at the Virginia Governor's School for Agriculture at Virginia Tech. Students will attend both courses within a particular major. Each major area will have a maximum of 20 students. The major areas include Agricultural Economics, Agricultural Engineering, Animal Science, Nutrition and Food Science, and Plant Science.

AGRICULTURAL ECONOMICS MAJOR

Ag Marketing: Understanding Consumer Behavior

Mr. Ryan Musselman

In this class students will complete the 20-question True Colors Personality assessment and participate in a group activity and discussion about our findings. Students will examine the 4 Ps of marketing. Students will investigate how companies segment, target and position their messaging about products, which directly affect consumer purchasing behavior. Finally, students will work together to select an agricultural product and develop a marketing strategy.

Choosing Wisely: What Economics Has to Offer

Dr. Mike Ellerbrock

Students will learn the basics of economic decision-making and how markets operate. Students will participate in microeconomic applications by investigating what can be done to successfully manage our natural resources.

AGRICULTURAL ENGINEERING MAJOR

Agricultural/Natural Resources Engineering

Course and Instructor TBD

Introduction to Biological Systems Engineering

Dr. Dwayne Edwards

Biological Systems Engineering (BSE) connects biology and engineering to solve complex, critical problems affecting each of us in the areas of sustainability, environmental protection, and human health. This discipline prepares graduates to develop engineering solutions that safeguard our land and water resources, detect and prevent human diseases, and produce food, pharmaceuticals, and polymers. Building on Engineering in Agriculture, Medicine and the Life Sciences, this team-taught course will describe current challenges in BSE and how students, graduates and faculty are working to design sustainable solutions.

ANIMAL SCIENCE MAJOR

Focus on the Animal Sciences

Ms. Jessica Neary

Each day's session will focus on an aspect of the animal sciences, based on species, purpose, and/or discipline. Students will explore and apply practical concepts related to animal husbandry and survey the most recent research occurring at Virginia Tech with respect to animal science.

Medicine Across the Species

Ms. Joyce Hong, Ms. Jenni Kelleher, and Ms. Karen Morris

Each day's session will focus on an aspect of veterinary medicine, based on species, purpose, and/or discipline. Topics include: companion animal care and prevention, food animal health care, preventing and toxicities in animals, and diagnostic testing.

NUTRITION AND FOOD SCIENCE MAJOR

Performance Nutrition from the Field to Outer Space

Ms. Trisha Sterringer

In this class we will study how nutrition fuels performance of different athletes including those in recreational and competitive sports, soldiers in the military, and even astronauts in outer space. We will also discuss the safety, effectiveness, and regulation of commonly used sports nutrition foods, beverages, and supplements.

Farm-to-Fork: Food Safety in the Fresh Produce Supply Chain

Ms. Alyssa Rosenbaum

In this class we will study the fascinating world of fermented foods. Our ancestors thousands of years ago had no refrigeration and no stores, and they used fermentation to save and process foods, improving nutritional value along the way. We will also look at additives used by the food industry, what they are, why they are used and what regulations they follow.

PLANT SCIENCE MAJOR

Plant Sciences Introduction: The Big Data Revolution in Agriculture

Dr. Song Li and SPES Faculty

Students will explore how genomic data can be used to improve crop production by decoding genome evolution and characterizing domestication processes. Students will learn how selective breeding and biotechnology can be used to identify genes underlying stable resistance traits. The challenges and opportunities of implementing precision agriculture in Virginia will be discussed. During the field trip, students will learn to use drones and ground robots to collect crop phenotypes.

Global Food and Nutrition Security

Dr. Tom Thompson and Dr. Jessi Agnew

This course will explore what food security is, why it is important, and how plant sciences can help solve global food security to assist in feeding the world's billions of people. We will explore several related topics, including agricultural productivity, food systems, the role of crop improvement, crops and human nutrition, perspectives from the developing world, and more.

ELECTIVE COURSES

All students will participate in elective courses during the last week of the program. Students will self-select one course prior to arriving at the Virginia Governor's School for Agriculture. Although the courses do not fit into the established major areas similar to the courses during week three, the intent of these courses is to continue to provide opportunities for students to explore the broad topic of agriculture and its cross-disciplinary nature. Each course will have a maximum of 25 students.

Agroforestry: Growing Crops, Trees, and Livestock in the Same Place
Dr. John Munsell

Agroforestry is a form of farming that intentionally combines trees with crops and/or livestock. Systems are designed to optimize economic, environmental, and social benefits by managing the biological interactions between species. Agroforestry is increasing in popularity in the United States and its applicability on large, medium, and small farms and urban sites make it a highly flexible land use that provides multiple benefits such as increased overall crop production, water quality protection, biodiversity enhancement, carbon sequestration, and visual quality. Students will spend one session focused on principles and practices, followed by two field sessions to see agroforestry in action.

Animal Reproduction
Ms. Jessica Keane and Ms. Jada Nix

How animals reproduce is both a fascinating topic and critically important for good animal management. The basic principles of male and female reproduction are explained. Main factors influencing fertility, the technologies used in the field, and the impact of reproduction on the production system is explained. The course will cover the anatomy and physiology of the bovine female reproductive tract, in vitro production of embryos from oocytes to embryos, and applied techniques that include artificial insemination and ultrasound.

The People of the Agricultural System
Mr. David Smilnak

Agriculture is a complex network of individuals, institutions, and organizations that work together to produce food for the country and the world. While we may be aware of individuals and their role, we seldom get to see how they work together to tackle agriculture's biggest challenges. This course is an introduction to those players, and how they work together. Over the three days, students will explore the roles of entities such as the Cooperative Extension, government agencies, and the contexts in which they work.

Equine Science: Raise Them Right – Managing Equine Youngstock from Birth to Sale
Ms. Natalie Duncan

This course will discuss raising foals for sale. The course begins with safety and handling of horses, basic grooming, discussions on breeds of horses and registries, and an intro into training principles for the first day. The second day focuses on foaling and neonatal care and includes hands- on opportunities to practice early foal handling & training techniques utilizing the Virginia Tech foals. The course ends with discussing marketing strategies for young horses across several disciplines and offers hands-on opportunities to learn about showing young horses to buyers and taking sales/registration photos.