Maryland CTE Programs of Study

Agriculture Animal Science II (2025)

General requirements. This course is recommended for students in Grades 11-12, and Agriculture Science I and II are the prerequisites. 1

1 **General requirements. This course is recommended for students in Grades 11-12, and Agriculture Science I and II are the prerequisites.** 1

Introduction. 2

A **Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.** 2.A

B **The Agriculture Career Cluster concentrates on scientific advancement of agriscience, cultivation, processing, and distribution of agricultural products, employing advanced technologies and sustainable practices to optimize global food systems. This Cluster also supports other plant- and animal-based industries including regenerative agriculture, sustainable logging, and fisheries. This Cluster has meaningful connections with the Energy and Natural Resources Cluster, highlighting a symbiotic relationship that emphasizes stewardship and resilient communities.** 2.B

C **The Agriculture Science Career & Technical Education Program of Study begins with Agriculture Science I, a common foundations course covering plant and animal biology, soils, water, and sustainable food systems. From there, districts may offer one or both two-course pathways: Crop Science II–III, which prepares students for the BASF Plant Science certification while using drone and satellite imagery in labs that align with both the University of Maryland's PLSC 112 Introductory Crop Science and the University of Maryland Eastern Shore's PLSC 184 Introduction to Plant Science; and Animal Science II–III, which culminates in the Elanco Fundamentals of Animal Science credential and capstone projects that map to UMD's ANSC 101 Principles of Animal Science as well as UMES's ANPT 114 Introduction to Animal Science. The Animal Science pathway also lays the academic and clinical groundwork for an optional fourth- level Veterinary Medicine IV course, enabling students to pursue the Elanco Veterinary Medicine certification.** 2.C

Skip to main content

D **Agriculture Animal Science II coursework aligns to every Elanco Fundamentals of Animal Science exam domain, and students test for the credential at year's end. Standards mirror the breadth of UMD's ANSC 101 Principles of Animal Science, giving students a solid bridge from secondary to post-secondary study.** 2.D

E **Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.** 2.E

F **Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.** 2.F

Knowledge and Skills. 3

A **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:** 3.A

1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work. 3.A.1
2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn. 3.A.2
3. Employ effective reading, writing, and technical documentation skills. 3.A.3
4. Solve problems using critical thinking techniques and structured troubleshooting methodologies. 3.A.4
5. Demonstrate leadership skills and collaborate effectively as a team member. 3.A.5
6. Implement safety procedures, including proper handling of hardware and following cybersecurity guidelines. 3.A.6
7. Exhibit an understanding of legal and ethical responsibilities in the Agriculture science field, following data privacy laws and best practices for security. 3.A.7
8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting. 3.A.8

B **The student identifies various career pathways in the agriculture science field. The student is expected to:** 3.B

1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in Agriculture science. 3.B.1
2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations. 3.B.2
3. Demonstrate effective interview skills for roles in agriculture science. 3.B.3

Skip to main content

'he student develops technology and digital literacy skills. The student is
xpected to: 3.C

1. Apply secure file-management practices (e.g., clear naming conventions, logical folder structures, routine backups, and version control) when handling digital documents, GIS layers, sensor logs, and drone imagery. 3.C.1
2. Evaluate the credibility and reliability of online resources—such as peer-reviewed journals, extension databases, and regulatory websites—to inform agriscience decisions and validate research findings. 3.C.2
3. Demonstrate safe, ethical, and legal use of digital platforms by following data-privacy laws, honoring software licenses and fair-use guidelines, and sharing geospatial or aerial imagery responsibly. 3.C.3
4. Collaborate effectively through cloud-based tools (shared drives, real-time documents, virtual whiteboards, project-management apps) to coordinate tasks, exchange data, and communicate with peers, mentors, and industry partners. 3.C.4
5. Integrate multiple software applications (spreadsheets, GIS programs, drone-flight planners, sensor dashboards, and basic statistical packages) to analyze and visualize data that support precision agriculture, animal-enterprise management, and sustainability decisions. 3.C.5

D The student integrates core academic skills into animal science practices. The student is expected to: 3.D

1. Apply mathematical concepts—including ratio, proportion, algebraic equations, and introductory statistics—to balance livestock rations, calibrate field equipment, compute medication dosages, and analyze yield- or growth-rate data. 3.D.1
2. Design and conduct scientific investigations by formulating testable hypotheses, controlling variables, collecting quantitative and qualitative data, and interpreting results with spreadsheets or graphing tools. 3.D.2
3. Produce clear, well-organized technical documents (lab reports, research briefs, standard- operating procedures) that follow accepted formatting and citation styles such as APA or MLA. 3.D.3
4. Read, interpret, and synthesize complex informational texts (peer-reviewed articles, extension bulletins, regulatory guidelines, product labels) to support evidence-based decision-making in crop and animal sciences. 3.D.4
5. Present findings to diverse audiences through oral presentations, data-rich posters, and multimedia formats, employing effective visuals, precise terminology, and audience- appropriate explanations. 3.D.5

E The student demonstrates the necessary skills to describe and measure the form-and- function relationships that govern animal growth, performance, and health. The student is expected to: 3.E

1. Identify major external and internal anatomical landmarks of cattle, swine, sheep, poultry, horses, dogs, and cats using charts, 3-D models, or palpation on live animals when appropriate. 3.E.1
2. Compare monogastric, ruminant, and avian digestive systems, relating structural differences to feed-utilization efficiency and product type (meat, milk, eggs, fiber). 3.E.2

Skip to main content

3 Measure heart rate, respiration, and body temperature before and after calm handling; graph results to explain homeostatic regulation. 3.E.3

4 Explain the role of endocrine hormones (growth, reproductive, stress) in regulating development and productivity. 3.E.4

5 Relate species-specific anatomical and physiological adaptations to their use in food, companion, research, or exhibition settings. 3.E.5

F The student demonstrates the necessary skills to apply genetic principles and reproductive technologies that improve animal populations. The student is expected to: 3.F

1 Use Punnett squares and simple heritability calculations to predict coat-color, polledness, or growth traits in livestock and companion animals. 3.F.1

2 Interpret Expected Progeny Difference (EPD) or Estimated Breeding Value (EBV) tables using teacher-supplied example datasets; record decisions on a templated worksheet to design a mating plan that meets a stated production goal (e.g., weaning weight, milk yield). 3.F.2

3 Compare artificial insemination, estrus synchronization, embryo transfer, and genomic selection; outline equipment, cost, and success rates for each using an instructor-provided comparison chart. 3.F.3

4 Summarize reproductive cycles and gestation lengths across bovine, porcine, ovine, caprine, avian, and canine species; create a management calendar for one chosen species. 3.F.4

5 Debate ethical, welfare, and regulatory considerations surrounding cloning and gene editing in food-animal production, citing current policy documents. 3.F.5

G The student demonstrates the necessary skills to formulate balanced rations that meet the nutrient requirements of diverse species and production stages. The student is expected to: 3.G

1 Classify common feedstuffs (forage, concentrate, by-product) by nutrient profile and origin; match feeds to appropriate species and life stages. 3.G.1

2 Determine dry-matter content with a microwave-drying method and interpret a commercial lab report for crude protein, energy, and fiber. 3.G.2

3 Use the Pearson square or free web-based software to balance a grower ration for swine and a replacement-heifer ration for dairy cattle. 3.G.3

4 Evaluate feeders and waterers for accessibility, waste reduction, and biosecurity; recommend improvements where needed. 3.G.4

5 Explain how nutrition influences growth rate, feed efficiency, reproduction, and carcass composition, citing current extension or peer-reviewed research. 3.G.5

H The student demonstrates the necessary skills to maintain animal well-being through preventive medicine, safe handling, and disease-control protocols. The student is expected to: 3.H

Skip to main content

1 Identify clinical signs of common infectious, parasitic, metabolic, and nutritional disorders; classify each by causal agent or deficiency. 3.H.1

2 Create a herd/flock health plan—using a structured template—that lists vaccination, deworming, and hoof-care schedules consistent with veterinarian-client-patient- relationship (VCPR) guidelines. 3.H.2

3 Calculate therapeutic dosages from drug-label directions and practice intramuscular, subcutaneous, and oral administration on inert materials (e.g., oranges, injection simulators) while wearing appropriate PPE under teacher supervision. 3.H.3

4 Design a biosecurity protocol—including traffic control, sanitation, quarantine, and wildlife exclusion—for a local animal enterprise; present the plan in infographic format. 3.H.4

5 Apply the Five Freedoms, Humane Slaughter Act, and industry audit criteria to evaluate animal-care practices and facility compliance; document findings on a checklist provided by the instructor. 3.H.5

I The student demonstrates the necessary skills to interpret animal behavior and apply low- stress handling techniques in species-appropriate facilities. The student is expected to: 3.I

1 Explain flight zone, point of balance, and herd/flock instinct in cattle, sheep, goats, swine, poultry, and horses. 3.I.1

2 Safely halter, lead, sort, or load animals using voice, visual, and tactile cues that minimize stress. 3.I.2

3 Assess chutes, alleys, parlors, kennels, or cages for animal flow and handler safety; create a hand-drawn layout (or use a free online chute-design tool) showing recommended modifications. 3.I.3

4 Record behavioral observations (vocalizations, posture, avoidance distance) and correlate them with physiological stress indicators collected in Standard E-3. 3.I.4

5 Compare behavior-based management in livestock operations with practices used in zoos, laboratories, and companion-animal shelters. 3.I.5

J The student demonstrates the necessary skills to connect production practices to product quality, economics, and professional opportunities in animal science. The student is expected to: 3.J

1 Outline production cycles, performance targets, and key performance indicators (KPIs) for beef, dairy, pork, poultry, small-ruminant, aquaculture, and companion-animal sectors. 3.J.1

2 Grade virtual or physical carcass specimens for yield and quality; relate live-animal management decisions to carcass outcomes. 3.J.2

3 Calculate feed-conversion ratio, break-even price, and gross margin for a chosen species using current market data. 3.J.3

4 Summarize federal regulations and quality-assurance programs governing antibiotic use, residue testing, humane handling, and product labeling. 3.J.4

Skip to main content

5 Develop a Supervised Agricultural Experience (SAE) or FFA Proficiency plan in an animal- science area, linking required artifacts to the Elanco certification evidence checklist and to ANSC 101 learning objectives. 3.J.5

6 Analyze the nutritional, cultural, and economic importance of major animal products (meat, milk, eggs, fiber, service animals) to U.S. and global consumers, citing current consumption data. 3.J.6