

CASE

Curriculum for Agricultural Science Education

Implementation Guide



CASE is an initiative of the National Council for Agricultural Education and is managed by the National Association of Agricultural Educators.

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Curriculum for Agricultural Science Education (CASE) empowers teachers to utilize powerful instructional strategies in inquiry-based, STEM-enriched teaching practices. To foster this environment, CASE develops comprehensive curriculum materials with purposeful design elements to promote rigor and relevance. However, the most powerful aspect of CASE is the professional development designed to reinforce and assist the implementation of CASE curriculum.

In order to use CASE curriculum, a teacher must successfully complete 50- to 100-hours of intense professional development per course they wish to implement. The professional development experiences are rigorous and the outcome is to provide the teacher an adequate overview of the content, pedagogy, and course design. In addition to the tangible aspects of the professional development, CASE professional development sessions provide a teacher confidence in teaching STEM-related concepts, which they may not be familiar with teaching, and encourage participation in a professional learning community to provide the teacher with support after the professional development session.

Once teachers are certified in a CASE course through professional development, they may offer the course to their students. CASE courses include lessons that build on previous lessons leading students to a higher understanding of big-picture STEM concepts. Rigorous lessons are delivered using inquiry-based instruction, student-directed learning, and activities, projects and problems (APP).

Five Steps to CASE Implementation

1. Determine the CASE pathway desired or initial CASE course to be offered in your program.
2. Attend CASE Institute for chosen course for teacher certification.
3. Plan equipment and supplies purchasing and/or sharing.
4. Work with school counselors on scheduling and student placement.
5. Utilize CASE Online for student curriculum access and End-of-Course assessments.

CASE Program of Study Pathways

CASE offers four Program of Study pathways comprised of ten courses forming pathways in Animal Science, Plant Science, Agricultural Engineering, and Natural Resources. A Program of Study pathway consists of four courses for students to develop knowledge and skills related to the pathway content area. Each pathway is designed to facilitate purposeful agricultural instruction integrated with science and mathematics while increasing rigor and independent learning strategies throughout the sequence of courses.

The recommended implementation of a pathway is to start with the introductory course and add courses within the pathway. Additional pathways may be added based on program needs and staffing. CASE does not require pathway implementation, and individual programs may utilize the curriculum to fit their needs. The following is an illustration of the CASE Program of Study pathway model.

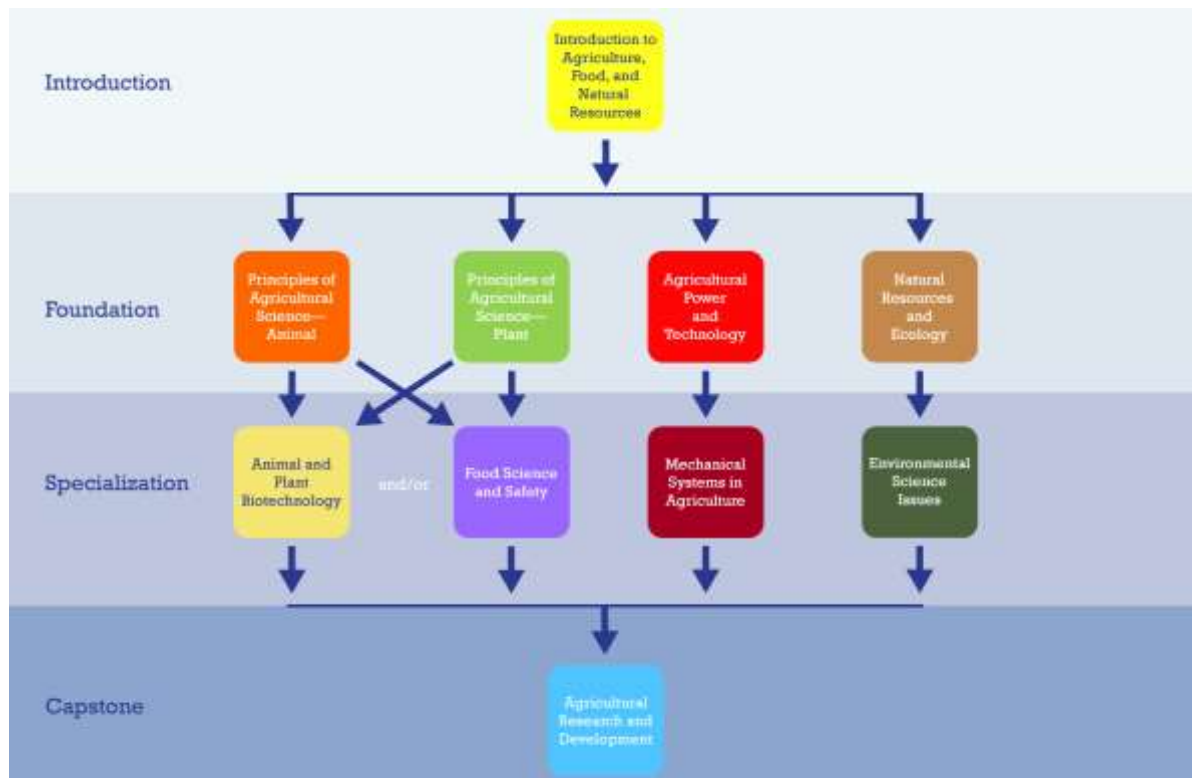


Figure 1. CASE Program of Study pathways

Course Descriptions

The following are course descriptions for the 10 year-long courses included in the four CASE Program of Study pathways.



Introduction to Agriculture, Food, and Natural Resources (AFNR)

The *Introduction to Agriculture, Food, and Natural Resources* course is intended to serve as the introductory course within the CASE Program of Study. The course is structured to enable all students to have a variety of experiences that will provide an overview of the fields of agricultural science and natural resources so that students may continue through a sequence of courses through high school. The knowledge and skills students develop will be used in future courses within the CASE program.



Principles of Agricultural Science – Animal (ASA)

Principles of Agricultural Science – Animal is a foundation-level course designed to engage students in hands-on laboratories and activities to explore the world of animal agriculture. Students will study animal anatomy, physiology, behavior, nutrition, reproduction, health, selection, and marketing. For example, students will acquire skills in meeting the nutritional needs of animals while developing balanced, economical rations. Throughout the course, students will investigate, experiment, and learn about documenting a project, solving problems, and communicating their solutions.



Principles of Agricultural Science – Plant (ASP)

Principles of Agricultural Science – Plant is a foundation-level course that teaches students about the form and function of plant systems. Students are immersed in inquiry-based exercises filled with activities, projects, and problems to teach them plant concepts through laboratory and practical experiences. Student experiences will include the study of plant anatomy and physiology, classification, and the fundamentals of production and harvesting.



Agricultural Power and Technology (APT)

Agricultural Power and Technology is a foundation-level course that teaches students about the fundamentals of agricultural engineering. Students are immersed in inquiry-based exercises that focus upon the form and function of material, machines, and tools used in agriculture. Students will apply technical skill while becoming competent in the process that is used to operate, repair, engineer, and design agricultural tools and equipment. Student experiences will involve the study of shop safety, tool operation, materials selection and use, fabrication, energy and power, machines, machinery management, and engineering.



Natural Resources and Ecology (NRE)

Natural Resources and Ecology is a foundation-level course within the CASE sequence of courses. The course provides students a variety of experiences in the field of natural resources and ecology. Students will explore hands-on projects and activities while studying topics such as land use, water quality, stewardship, and environmental agencies. Students will focus on an ecosystem to study throughout the course and apply principles of natural resources and ecology to that ecosystem.



Animal and Plant Biotechnology (APB)

Animal and Plant Biotechnology, a specialization-level course in the CASE Program of Study, provides students with experiences in industry appropriate applications of biotechnology related to plant and animal agriculture. Students are expected to become proficient at skills involving micropipeting, bacterial cultures and transformations, electrophoresis, and polymerase chain reaction. Students will maintain a research level Laboratory Notebook throughout the course documenting their experiences in the laboratory. Research and experimental design will be highlighted as students develop and conduct industry appropriate investigations.



Food Science and Safety (FSS)

Food Science and Safety is a specialization course in the CASE Program of Study. Students will complete hands-on activities, projects, and problems that simulate actual concepts and situations found in the food science and safety industry. Students will investigate areas of food science including food safety, food chemistry, food processing, food product development, and marketing. Students will maintain a Laboratory Notebook throughout the course documenting their experiences in the laboratory. Research and experimental design will be highlighted as students develop and conduct industry appropriate investigations.



Mechanical Systems in Agriculture (MSA)

Mechanical Systems in Agriculture is a specialization-level course within the CASE sequence of courses. Throughout the course, students will use technical skills investigating small engines, agricultural structures, automation, and technology while becoming competent in the process used to operate, repair, engineer, and design agricultural tools and equipment.



Environmental Science Issues (ESI)

Environmental Science Issues is a specialization-level course that enables students to research, analyze, and propose sustainable solutions to environmental issues. Students are immersed in inquiry-based exercises filled with activities, projects, and problems, which develop data acquisition and analysis techniques, critical thinking, and evaluation abilities related to environmental issues.



Agricultural Research and Development (ARD) Capstone

Agricultural Research and Development is the capstone course designed to culminate students' experiences in agriculture, based on the pathway of study they pursued. Woven throughout the course are projects and problems based in practical applications and designed to develop and improve employability skills of students. Students will further enhance critical thinking and teamwork skills as they expand on content knowledge from previous CASE courses. In this course, students will learn to solve complex real-world problems, conduct research, analyze data, work in teams, and develop new products and protocols.

Teacher Certification

To receive and implement CASE curricula, the teacher must attend a professional development session called a CASE Institute. A CASE Institute is a 50-100 hour session that provides hands-on professional development in the instructional strategies used in delivering course content. Once a teacher has successfully completed the professional development session, the teacher is certified to teach the course. Typically CASE Institute registration costs range from \$1,800-\$3,000. This cost includes the curriculum with lifetime updates, most meals, and lodging, and materials used in the institute.

CASE Institute sessions provide teachers important background related to the pedagogy used in CASE courses and practice teaching lessons and laboratories to prepare them for classroom instruction. Teachers are required to attend the entire multiple day professional development. CASE Institute instructors determine if the teacher is adequately prepared to provide instruction using CASE curricula. Practicing CASE teachers, known as Lead Teachers, facilitate the instruction of the CASE Institute. Peer teaching and the development of a professional learning community during the CASE Institute provide rich experiences for teachers.

CASE certification is the intellectual property of the teacher who completes the professional development. Certification is a measure of professional growth in topics of CASE pedagogy and assurance of competency for using specific CASE materials. Therefore, CASE certification stays with a teacher throughout their career regardless of their place of employment.

In the event of a CASE certified teacher leaving a program and being replaced by a non-certified CASE teacher, a probationary period is offered to assist the transition. The probationary period ensures students are enrolled in a CASE sequence of courses are not penalized for the transition of a teacher. Additional details on teacher transition policies may be found on the CASE website, <http://www.case4learning.org/index.php/certification/transitioning-teachers>.

BriefCASE Courses and Professional Development

CASE recently added BriefCASE courses, which can be added to any program of study pathway. BriefCASE courses maybe a semester or less in length. Condensed professional development workshops provide teachers training for the instruction related to modular CASE courses. Workshops are offered at state, regional, and national conferences or incorporated as an added offering of a CASE Institute. Once a teacher has successfully completed BriefCASE professional development session, the teacher is certified to teach the specific CASE course.

BriefCASE sessions provide teachers important background related to the pedagogy used in CASE curricula and practice teaching various lessons to prepare them for classroom instruction. Teachers are required to attend the entire workshop and CASE Institute instructors determine if each teacher is adequately prepared to provide instruction using CASE curricula. Currently, one BriefCASE course, *Agricultural Business Foundations*, is available to teachers.



Agricultural Business Foundations (ABF)

Agricultural Business Foundations introduces students to business management in agriculture. Throughout the course are practical and engaging activities, projects, and problems to develop and improve business and employability skills. Additionally, students investigate and develop viable business plans in order to solve local problems. The business plan ideas are communicated to student peers and members of the professional community.

Budgeting and Ordering Equipment and Supplies

Budgeting is dependent on what materials are currently available in the school. CASE provides an equipment and supplies inventory for each course. It is highly recommended that a school complete this inventory to determine what is currently available within the program. Interdepartmental sharing, i.e. with the science department, is strongly encouraged. Upon determining what the needs of the program are, a Purchase Manual is available for each course. The course Purchase Manual contains all items needed to teach a course with vendors who provide discounted pricing for the items. Many items, like balances, LabQuest2, and glassware, are used in multiple courses so if a pathway is implemented, subsequent courses cost less.

To access course equipment needs, select the appropriate course and download the recommended files for that course at www.case4learning.org/index.php/usingcasepurchasemanuals. CASE does not require equipment purchase or use of specific vendors. Full implementation of curriculum depends on proper equipment but is subject to individual school goals.

Student Placement

Due to the rigor and scaffolding of content and technical skills, proper placement of students in CASE courses is encouraged. CASE courses, with the exception of *Agricultural Business Foundations*, are designed to be a **full year** of study. Limiting a course to a semester significantly reduces the time of instruction, reducing the content a teacher can deliver and the degree of scaffolding and rigor of the course.

When implementing a pathway, it is important to register students in courses at the appropriate place in the sequence. The introductory level course is designed for grades 8-10, therefore placing a senior in the course may not be appropriate. If implementing the capstone course, it is important that a student has completed the previous courses in the pathway, as the rigorous content assumes students have background knowledge and laboratory skills developed in previous courses. Schools should work with guidance counselors in developing proper prerequisites for courses and ensuring student success in the sequence of courses.

CASE ONLINE™

CASE Online and Assessment

CASE uses a blend of formative and summative assessment strategies. The curriculum is designed on the theory of spiraling student learning experiences by introducing new material and relating it to previously learned material to help the student understand the interconnectedness of the subject matter. CASE employs several strategies to ensure that student misconceptions are not present, or proficiency of skills and knowledge is learned prior to moving the student to the next set of information.

CASE Online is a web-based system designed to provide online assessment tools, as well as online access to the student version of each course. Flipped video access allows teachers to shift instruction to a learner-centered approach. Teachers can use an open database of questions to develop any type of assessment, such as mid-term quizzes. This system also provides the CASE End-of-Course (EoC) assessments. End-of-Course exams are secure online tests. Each exam is aligned to course lesson concepts.

The End-of-Course questions are coded for cross-curricula subject matter, such as science and mathematics alignment. This allows for tracking of student proficiency in science and math concepts. Students who take the End-of-Course examinations and meet the national cut score qualify for a certificate of completion from CASE.

Teachers and administrators have the ability to correlate student performance on the End-of-Course assessments with specific academic standards or outcomes. The system provides an effective means to evaluate student proficiency related to lesson concepts of a CASE course.

CASE Online is a fee-based learning management system. Account rates range from \$8.00-\$15.00 each, depending on quantity ordered. To order CASE Online or view the pricing structure, please visit <http://ecommercecaseonline.org/>.