CASE

Detailed Course Outline

Unit 1 – Defining Agricultural Research and Development

Lesson 1.1 Agricultural Advances

1. Research and development of new ideas and innovations are used to solve problems, provide goods, and increase productivity in agriculture.
    - Identify significant advances in agriculture and determine the need that drove the advance.
    - Determine current needs and problems in agriculture.
2. Documentation of plans and processes is used by researchers in the development of new ideas and products.
    - Organize notebooks to record coursework and laboratory projects.
3. Solving complex, real-world problems includes defining the problem, proposing a solution, developing a protocol, collecting and analyzing data, and communicating results.
    - Identify the steps of the problem-solving process in a historical product as well as their specialization project.

Lesson 1.2 Project Management

1. Efficient project management is based on an awareness of personal strengths.
    - Complete the Gallup StrengthsFinder survey and identify their talents.
    - Develop a personal growth plan to strengthen their talents and determine how their talents will drive them in the course and future academic options.
2. Project management requires planning, scheduling, self-motivation, and prioritization skills.
    - Perform a decision-making exercise.

Unit 2 – Problems and Solutions

Lesson 2.1 Defining the Problem

1. Agricultural researchers are faced with a multitude of local, national, and global issues.
    - Research agricultural problems at local, regional, national, and global levels and select three to five subtopics to refine.
2. Brainstorming is a technique used to define and refine topics and problem statements.
    - Utilize brainstorming techniques to develop focused topics for potential research ideas.
3. Practical considerations, such as time, motivation, materials, and support, are constraints when selecting a problem to solve.
    - Identify and discuss constraints associated with their potential research project.
4. Writing a well-defined and accurate problem statement guides research and helps determine if the solution has solved the problem.
    - Write a problem statement for their research project.

Lesson 2.2 Proposing Solutions

1. Finding solutions to a problem are impacted by social, legal, financial, and environmental considerations.
    - Consider impacts of research and development surrounding a specific issue.
    - Develop a list of potential solutions and use a decision matrix to determine the best solution to research.
2. A feasibility study may be used to determine the viability of new ideas and innovations.
    - Complete a feasibility study and evaluate a proposed research project.
3. A proposed solution must be written to be testable or solvable.
    - Write a solution proposal to submit for approval.
4. Partnering with professionals in the field can validate and guide research when solving a problem.
    - Identify potential professional resources and develop a professional network.

Unit 3 – Methodology

Lesson 3.1 Planning Ahead

1. Carefully planned step-by-step instructions guide the problem solving process.
    - Practice writing and following step-by-step instructions for simple daily activities.
    - Write a draft of step-by-step instructions for the research and development project.
2. Project scope is determined by the resources available.
    - Research and identify uses, safety practices, and limitations for proposed tools, materials, and equipment.
3. Researchers use a literature review to curate a collection of information on a topic.
    - Summarize research and information pertinent to the research project into a literature review.

Lesson 3.2 Data Collection

1. The problem dictates the type of data needed for valid results.
    - Compare commonly used data collection instruments.
2. Selection of appropriate data collection instruments is necessary for valid data.
    - Develop protocol for data collection in a research and development project.
3. Standards are necessary when collecting data.
    - Identify standards to use for collected data from a research and development project.
4. An ongoing evaluation process monitors the validity of the solution.
    - Plan how to evaluate a research and development project.
    - Conduct research according to protocols and plans developed.

Unit 4 – Reporting Data

Lesson 4.1 Results and Conclusions

1. Researchers use graphs and charts to interpret, analyze, and organize data.
    - Complete an online statistics tutorial.
    - Apply statistical analysis to sample data.

2. Researchers collect and analyze data to solve a problem.
    - Organize, interpret, and analyze data collected through the research and development process.
3. Conclusions of research are derived from data.
    - Formulate a conclusion statement for the research and development process.
4. Project reflection encourages expansion and continuation.
    - Write a reflection on the completed research project.

Unit 5 – Communication

Lesson 5.1 Communicating Results

1. Communicating results to a target audience disseminates the body of research for further use.
    - Identify the target audience for research results.
    - Review articles for professional communication techniques.
    - Write a scientific abstract for a research paper.
2. Sharing a professional body of work promotes ongoing research.
    - Submit a formal research paper to peers and a professional research committee for review prior to publishing.
3. Researchers use various media to communicate results professionally.
    - Select and develop an alternative dissemination method for research results.

Lesson 5.2 Going Forward

1. Society is impacted by new solutions to problems.
    - Increase public awareness of the research problem, solution, and product.
2. A portfolio of work communicates all aspects of research.
    - Complete a self-evaluation of performance, skill acquisition, and contributions to agriscience.
    - Compile a professional portfolio with the body of work completed in this course and other works of significance.