RESEARCH METHODOLOGY AND ACADEMIC WRITING IN AGRICULTURAL SCIENCES

COURSE OUTLINE

Responsible: Filippos Ververidis

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.2.002.0	**SEMESTER**	2nd
COURSE TITLE	Research Methodology and Academic Writing in Agricultural Sciences		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	5
Total	**0**	**5**

COURSE TYPE general background, special background, specialised general knowledge, skills development	General background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/AGRO130/

2. LEARNING OUTCOMES

Learning outcomes

Learning Outcomes

The aim of this course is to provide students with the fundamental knowledge and practical skills required to understand and effectively communicate scientific research to an academic audience. This course emphasizes the concept of **student-centred learning**, which aligns with the **European Higher Education Area (EHEA)** philosophy. Moreover, explicitly incorporates competencies such as **critical thinking**, **scientific reasoning**, and **communication to specialist and non-specialist audiences**, which are now considered core learning outcomes in most Erasmus curricula.

Why this course?

Science is more than the accumulation of knowledge—it is a way of thinking. **Research Methodology and Academic Writing in Agricultural Sciences** introduces students to the principles through which scientific knowledge is generated, validated, communicated, and critically evaluated.

The course is designed to transform students from passive recipients of information into active researchers who are capable of formulating research questions, designing experiments, analysing scientific evidence, and communicating research findings effectively and ethically. Particular emphasis is placed on developing the analytical, critical, and communication skills required for modern agricultural research.

The course is structured into two complementary modules.

Module A. Research Methodology

This module focuses on the scientific method and the principles of research design in Agricultural Sciences. Students develop an understanding of how scientific knowledge is generated and validated through systematic investigation.

By the end of this module, students will be able to:

- formulate clear and scientifically relevant research questions and hypotheses;
- distinguish between different types of scientific research and select appropriate methodological approaches;
- understand the ethical principles governing scientific research, including research integrity and responsible conduct;
- design experiments that ensure scientific validity, reliability, and reproducibility;
- select appropriate methods for data collection, recording, organization, and preparation;
- understand the principles of experimental design and quality assurance in scientific research;
- prepare datasets for descriptive and inferential statistical analysis; and
- use statistical software packages (e.g. SPSS) to analyse and interpret experimental data.

Students are also introduced to the fundamental principles of statistics as an essential tool for scientific reasoning rather than merely a computational procedure. Descriptive statistics are presented as methods for organizing and summarizing data, whereas inferential statistics are introduced as tools for hypothesis testing and evidence-based decision-making using statistical procedures such as the *t*-test and Analysis of Variance (ANOVA). Particular emphasis is placed on understanding **why** statistical methods are applied, **when** they are appropriate, and **how** statistical outcomes should be interpreted within a scientific context.

Module B. Academic Writing and Scientific Communication

The second module focuses on the communication of scientific knowledge through academic writing and oral presentation.

Students develop practical skills in:

- searching, retrieving, and critically evaluating scientific literature using international bibliographic databases;
- synthesizing scientific evidence from multiple sources;
- preparing scientific manuscripts according to internationally accepted academic writing standards, including undergraduate dissertations, postgraduate theses, and research articles;
- designing and delivering effective scientific presentations for conferences, seminars, and other academic events.

As an integral part of the course, students may participate in a **simulated scientific conference**, where each student assumes the role of a conference delegate and presents an individual scientific contribution. This experiential learning activity provides authentic experience in scientific communication while familiarizing students with the organization and professional standards of scientific conferences.

Through this process, students gain experience in:

- presenting scientific work to an academic audience;
- responding to questions and participating in scientific discussion;
- communicating research findings clearly and confidently; and
- applying the principles of research integrity and academic ethics throughout the scientific communication process.

Students are encouraged to select research topics that reflect their own academic interests within Agricultural Sciences, promoting initiative, independent learning, critical thinking, and creative engagement with contemporary scientific literature.

Learning Outcomes

Upon successful completion of the course, students will be able to:

- formulate scientifically sound research questions and design experiments using appropriate methodologies;
- select suitable techniques for data collection, management, and statistical analysis;
- critically evaluate the validity, reliability, and significance of scientific findings;
- interpret experimental results using appropriate statistical approaches;
- retrieve, analyse, synthesize, and critically evaluate scientific literature from international databases;
- prepare scientific manuscripts following internationally accepted standards of academic writing;
- communicate scientific findings effectively through professional oral presentations and scientific discussion;
- apply the principles of research integrity, academic ethics, and responsible scientific communication throughout the research process.

Intended Audience

This course is intended for undergraduate students enrolled in the Agricultural Sciences programme who wish to develop a solid foundation in scientific research methodology and academic communication. It is particularly valuable for students planning to pursue postgraduate studies or careers in research, innovation, agricultural consultancy, or any professional field requiring the critical evaluation and interpretation of scientific data.

The course serves as a bridge between theoretical knowledge and the production of new scientific knowledge. Rather than simply teaching students **how to write a scientific paper**, it develops the mindset, analytical skills, and scientific reasoning expected of modern researchers, preparing them to move from understanding existing knowledge to contributing to its advancement.

General Competences

Generic Competences

Upon successful completion of the course, students are expected to have developed the ability to:

- search for, retrieve, critically evaluate, analyse, and synthesize scientific data and information using appropriate digital technologies and scientific databases;
- make informed and evidence-based decisions;
- adapt effectively to new scientific challenges and learning environments;
- plan, organize, and manage individual and collaborative projects;
- work independently with responsibility and initiative;
- collaborate effectively as members of multidisciplinary teams;
- generate innovative research ideas and formulate scientific hypotheses;
- demonstrate creativity, critical thinking, and inductive reasoning in the analysis and interpretation of scientific evidence.

3. SYLLABUS

Course Content

The course combines theoretical instruction with experiential learning through the organization of a **simulated scientific conference**, in which students actively participate as conference delegates. During the first five weeks, students receive the theoretical background and practical guidance required to prepare, write, and present an individual scientific paper. The remaining part of the course is devoted to the preparation, presentation, discussion, and evaluation of student presentations.

Module A. Research Methodology

This module introduces the fundamental principles of scientific research and experimental design in Agricultural Sciences. Topics include:

1. **Introduction to Scientific Research**
   - Scientific inquiry and the research process
   - Types of scientific research
   - Formulation of research questions and hypotheses
2. **Research Ethics and Academic Integrity**
   - Principles of responsible research conduct
   - Academic integrity
   - Plagiarism: prevention, detection, and good scientific practice
   - Ethical use of Artificial Intelligence (AI) in scientific research and academic writing
3. **Scientific Information Retrieval**
   - Literature search strategies
   - Scientific databases (Scopus, Web of Science, PubMed, Google Scholar, etc.)
   - Effective use of keywords, Boolean operators, and citation tracking
   - Critical evaluation of scientific sources
4. **Research Methodology and Scientific Evaluation**
   - Structure of scientific research
   - Critical appraisal of scientific publications
   - Principles of peer review
   - Evaluation of scientific evidence
5. **A brief overview of Experimental Design and Basic Statistical Concepts**
   - Purpose and principles of experimentation
   - Introduction to Analysis of Variance (ANOVA)
   - Completely Randomized Designs (single-factor and factorial experiments)
   - Randomized Complete Block Designs
   - Interpretation of experimental results

Module B. Academic Writing in Agricultural Sciences

This module develops the practical skills required for preparing and communicating scientific work according to internationally accepted academic standards.

Topics include:

1. **Preparation of Scientific Communications**
   - Types of scientific presentations (conference papers, invited lectures, seminars, workshops)
   - Organization and operation of scientific conferences
   - Student participation in a simulated scientific conference
2. **Literature Search and Information Management**
   - Accessing scientific literature through the Hellenic Mediterranean University Library
   - Comparative use of major bibliographic databases
   - Efficient literature searching using Google Scholar and scientific databases
   - Reference management and citation practices
3. **Scientific Writing**
   - Structure of a scientific paper (Title, Abstract, Introduction, Materials and Methods, Results, Discussion, Conclusions)
   - Writing style and scientific language

- Preparation and organization of scientific manuscripts
- Collaborative writing exercises

4. **Artificial Intelligence in Academic Writing**
   - Appropriate use of AI tools in scientific writing
   - Opportunities and limitations of generative AI
   - Responsible AI use and transparency
   - Strategies for avoiding plagiarism and maintaining academic integrity
5. **Preparation of Oral Presentations**
   - Principles of effective scientific communication
   - Presentation design
   - Public speaking techniques
   - Responding to questions and scientific discussion
6. **Scientific Presentation Design**
   - Development of professional PowerPoint presentations
   - Design principles for scientific slides
   - Effective use of figures, tables, graphs, and animations
   - Presentation of scientific data following international conference standards

Practical Component

Throughout the semester, students prepare an individual scientific paper based on a topic within the field of Agricultural Sciences. Under the supervision of the course instructor, they conduct a comprehensive literature review, prepare a scientific manuscript, and present their work orally during the simulated scientific conference. The presentation is followed by scientific discussion and constructive peer feedback, providing students with authentic experience in academic communication and scientific dissemination.

4. TEACHING and LEARNING METHODS - EVALUATION	
DELIVERY Face-to-face, Distance learning, etc.	Mode of Delivery - The course is delivered through a combination of interactive lectures, experiential learning, problem-based learning, and student-centred activities.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Use of ICT in teaching, laboratory education, communication with students

Teaching and Learning Methods

The course is delivered through a combination of **interactive lectures**, **experiential learning**, **problem-based learning**, and **student-centred activities**.

Each four-hour weekly session is divided into two complementary components:

• **Theoretical Component:** The first half of each session consists of interactive lectures supported by PowerPoint presentations, multimedia resources, practical examples, and open classroom discussion. Students are encouraged to actively participate by relating theoretical concepts to real-world examples and their own academic experiences. Particular emphasis is placed on developing students' confidence in scientific communication and public speaking.

• **Practical Component:** The second half of each session is devoted to experiential learning activities, including individual and group exercises, case studies, literature analysis, scientific writing workshops, data interpretation, and preparation of oral presentations. These activities allow students to apply the concepts introduced during the lectures in an authentic research-oriented environment.

The course also incorporates the organization of a **simulated scientific conference**, during which students present their own scientific work and participate in scientific discussion, providing valuable experience in academic communication and peer interaction.

Use of Information and Communication Technologies (ICT)

Teaching is supported through the use of modern digital technologies, including:

• PowerPoint presentations;

• multimedia educational resources and videos;

• online scientific databases and bibliographic search tools;

• statistical software demonstrations (e.g. SPSS);

• Artificial Intelligence (AI) tools for academic writing and scientific communication, with emphasis on their ethical and responsible use;

• the University's **e-Class** learning management system for asynchronous learning, communication, distribution of educational material, assignment submission, and continuous interaction between students and the instructor.

Teaching Activities (See below)

TEACHING METHODS

The manner and methods of teaching are described in detail.

Activity	**Semester workload**
Lectures and interactive classroom discussion	44
Experiential learning activities and practical workshops	22
Literature search and independent study	18
Preparation of scientific manuscript	18
Preparation of oral presentation	12
Study for examinations	11
Course total	**125**

STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	**Student Assessment** The language of instruction and assessment is **Greek**. Student performance is assessed through a combination of formative and summative assessment methods. Assessment may include: • **Final written examination** (mandatory); • **Optional mid-term assessments**, which may contribute up to **40%** of the final grade, provided that students choose to participate. The number, content, and weighting of these assessments are announced at the beginning of each academic semester; • evaluation of students' ability to analyse scientific problems, critically interpret research findings, and apply scientific reasoning. Written examinations may include a combination of: • multiple-choice questions; • true/false questions; • matching exercises; • short-answer questions; • problem-solving exercises; • case-study analysis. Assessment is designed to evaluate not only students' knowledge and understanding of the course material but also their critical thinking, analytical reasoning, problem-solving ability, and capacity to apply scientific methodology in real-world agricultural contexts.

5. ATTACHED BIBLIOGRAPHY

RECOMMENDED READING (in chronological order)

- Thomas C.G., **2021**. “Research Methodology and Scientific Writing”, Second Edition. Kerala Agricultural University
- Thrissur, Kerala, India, Springer. ISBN 978-3-030-64864-0, https://doi.org/10.1007/978-3-030-64865-7.
- Hall G.M., 2001. “How to present at Meetings”, BMJ Books London, σελ. 79.
- Peat J., Elliot E., Baur L, and Keena V., 2002. “Scientific writing. Easy when you know how”, BMJ Books London, σελ. 292.