Course Title	**Research Methodology**				
Course Code	ABS407				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	4th year /7th semester				
Teacher's Name	Dr. Panagiotis Paoullis				
ECTS	5	Lectures / week	3	Laboratories/week	2
Course Purpose	Research methodology encompasses a systematic approach that guides students in designing and executing research projects, collecting and analyzing data, and drawing meaningful conclusions. The primary goal of research methodology is to ensure rigor, validity, and reliability in the research process. By employing appropriate research designs, formulating research questions, selecting suitable data collection methods, and employing sound data analysis techniques, students can generate robust findings and contribute to the advancement of knowledge. By developing proficiency in research methodology, students are equipped with the necessary skills to critically evaluate existing research and undertake their own independent investigations, fostering innovation and progress in their respective fields.				
Learning Outcomes	**- Introduction to Research Methodology in Medical and Biological Sciences** Importance of research methodology in the scientific process. Familiarity with different research designs and methods specific to medical and biological sciences. Understanding the sequential steps required to organize references in a literature review and perform experimental work. Ethical principles and guidelines in research conduct. Ethical considerations in research involving human subjects and data handling. **- Formulating Research Questions and Objectives** Developing clear and concise research questions and objectives. Significance of well-defined research questions in guiding the research process. Differentiating types of research designs and their suitability for specific research questions. Understanding the strengths and limitations of various research designs **- Data Collection Methods** Knowledge of various data collection methods (surveys, interviews, observations) in medical and biological research. Determining appropriate sample sizes and employing sampling techniques. **- Instrument Development** Developing and validating research instruments (questionnaires, measurement scales). Reliability and validity assessment. **- Data Quality, Statistical Analysis, and Interpretation**				

	Methods for ensuring data quality, including cleaning, verification, and validation. Concepts of reliability and validity in research data. Basic statistical analysis techniques for quantitative and qualitative data. Interpreting research data and drawing meaningful conclusions. **- Structure and Presentation of Research Findings** Understanding the essential components and structure of a research paper or thesis. Effective organization and presentation of research findings. Knowledge of citation styles and proper referencing practices. Managing references and utilizing databases for literature review **- Systematic Reviews** Explaining the results of systematic reviews and meta-analyses in medical and biological Sciences (e.g., development of search techniques, critical appraisal tools). Strategies for staying up to date with the latest advancements in the field.		
Prerequisites	None	Corequisites	None
Course Content	Theory: • Importance of research methodology • Overview of the research process • Different scientific research designs and methods • Characteristics of effective research questions • Developing clear and concise research objectives • Selecting Appropriate Research Designs: • Types of research designs (experimental, descriptive, correlational, etc.) • Suitability of research designs for specific research questions • Strengths and limitations of different research designs • Time Management and Project Planning • Goal setting and resource allocation • Ethical guidelines and principles in research • Ethical considerations in research involving human subjects. • Data handling and confidentiality • Overview of data collection methods (surveys, interviews, observations) • Sampling techniques and sample size determination • Considerations for selecting appropriate data collection methods. • Developing research instruments (questionnaires, scales) • Validating research instruments for reliability and validity • Techniques for ensuring instrument quality. • Data Quality and Reliability: • Ensuring data quality through cleaning, verification, and validation • Reliability and validity concepts in research data • Techniques for improving data reliability. • Basic statistical analysis techniques for quantitative and qualitative data • Interpreting research data /critical thinking • Drawing meaningful conclusions from data analysis • Statistical software (e.g., SPSS, R, SAS, STATA), • Structuring a Research Paper or Thesis • Components and structure of a research paper or Thesis • Organizing research findings effectively		

	• Writing styles and conventions • Citation styles and referencing practices. • Managing references and utilizing databases for literature review • Effective literature review techniques • Reference management software, academic databases (e.g., PubMed, Scopus, Web of Science) • Presenting Research Findings: • Developing effective presentation skills • Creating engaging presentations • Handling questions and discussions during presentations <u>Workshops/exercises:</u> Workshops and exercises are an integral part of the course, designed to enhance understanding and consolidate theoretical concepts. Through hands-on experiences, these exercises complement the course material and facilitate deeper exploration. Students will engage in various workshops and exercises to further enhance understanding of research methodology: - Developing Research Questions: Participants work in groups to formulate research questions and receive feedback. -Designing a Research Study: Participants create a research design for a specific research question and discuss its strengths and limitations. -Data Collection Methods: Participants practice using different data collection methods through role plays or simulations. -Data Analysis and Interpretation: Participants analyze provided data sets and interpret the results using appropriate statistical techniques. -Effective Presentation Skills: Participants deliver short presentations on their research findings and receive feedback on their presentation style and content. These workshops provide interactive learning experiences and foster critical thinking and problem-solving skills, provide hands-on opportunities for participants to apply the knowledge gained in each lecture.
Teaching Methodology	Research Methodology combines theoretical lectures with practical exercises and workshops to provide a comprehensive learning experience. Students gain an understanding of research methodology in the scientific process and become familiar with different research designs and methods specific to medical and biological sciences. They learn to develop clear and concise research questions and objectives and understand the significance of well-defined research questions in guiding the research process. The course covers various data collection methods, sampling techniques, and sample size determination. Students also learn about instrument development and validation, ensuring the reliability and validity of research instruments. The curriculum includes methods for ensuring data quality, data analysis techniques for quantitative and qualitative data, and the interpretation of research findings. Additionally, students gain knowledge of citation styles, proper referencing practices, and effective management of references and databases for literature review. Ethical principles and guidelines governing research conduct are explored, along with ethical considerations in research involving human subjects and data handling. The teaching methodology incorporates lectures, detailed notes with visual

	aids, in-class discussions to encourage active engagement and critical analysis, and laboratory exercises conducted in a well-equipped laboratory under the guidance of experienced teaching personnel. Through practical application and the submission of comprehensive laboratory reports, students demonstrate their understanding and proficiency in research methodology. The integrated approach of theoretical lectures, and workshops fosters a comprehensive understanding of research methodology in the medical and biological sciences. This methodology cultivates critical thinking, problem-solving skills, and the practical application of concepts, preparing students for future careers in the field of medical and biological research.
Bibliography	(a) Textbooks: 1. LAAKE, Petter; BENESTAD, Haakon Breien; OLSEN, Bjorn Reino (ed.). Research methodology in the medical and biological sciences. Academic Press, 2007.nal reading: 2. BOWLING, Ann. Research methods in health: investigating health and health services. McGraw-hill education (UK), 2014. (b) References: A list of recently published articles will be provided for further reading.
Assessment	For student evaluation, the overall grade is determined by a written midterm exam (20%), workshop/exercise grade (20%) and a written final exam (60%). The mid-term exam is carried out between the 6th and 8th week, and it mainly includes short answer questions and problem- solving questions and examines most modules of the course. As far as the laboratory grade is concerned, it comprises of the evaluation of the laboratory reports (60% of the laboratory grade) submitted by the students for each experiment and a final laboratory examination (40% of the laboratory grade) which mainly includes short answer questions and problem-solving questions. In the laboratory reports, students are asked to describe the experiment procedure, to evaluate and analyse their results and to answer specific questions. The following criteria are considered when evaluating laboratory reports: (a) experimental data collection (30%), (b) data analysis (40%), and application of theory to draw conclusions (30%). The final exam of the course is carried out during the 14th-16th week of each semester, and it includes short answer questions, critical thinking questions, and problem-solving questions regarding all course modules. The final assessment of the students is formative and summative and complies with the subject's expected learning outcomes and the quality of the course.
Language	Greek, English