Identification	Subject (code, title, credits)	ETR 645, Research methods, 8 ECTS credits
	Department	Physics and Electronics
	Program (undergraduate, graduate)	Graduate
	Term	Fall 2025
	Instructor	Ahmad Asimov ph.D
	E-mail:	fizikasimov@gmail.com
	Phone:	(daxili 255)
	Classroom/hours	302N Monday/Wednesday
	Office hours	Tuesday: 15:00-16:00/ Thursday: 15:00-16:00
Prerequisites		
Language	English	
Compulsory	Compulsory	
Required textbooks and course materials	**Textbooks:** 1. Research Methodology. Methods & Technique : Kothari. C.R. 2004 2. Intellectual Property – Copyrights, Trademarks, and Patents by Richard Stim, Cengage Learning. 2000 3. Practical Research : planning and Design(8th Edition) – Paul D. Leedy and Jeanne E. Ormrod. 2005 4. Methodology of Education Research – K.S. Sidhu. 2002 5.Tests, Measurements and Research methods in Behavioural Sciences- A.K. Singh. 2006	
Course description	Course Description: Course includes an overview of research method techniques, theoretical foundations of empirical research, principles of the scientific method, experimental designs, analyses of research designs, research protocol, and formation of research hypothesis. This course provides students with the body of theoretical knowledge and practical skills of scientific work. Students will identify an appropriate research problem, conduct a literature review, engage in data collection, analyse the data and present findings in a formal research report.	
Course objectives	The primary objective of this course is to develop student's research orientation and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them with the concepts and principles used in research and to business research methods and their approach. The objective of this course is to allow students learn and practice: • the process of thesis writing • how to plan a research project • the quantitative and qualitative research methods • Students will develop and demonstrate skills in using library sources; • Students will interpret, review, and critique research studies in the • preparation of a brief literature review;	
Learning outcomes	At the end of this course, each student will be able to: • Identify a core issue or objective as a research topic • understand the purpose of research; • undertake research using the methodology chosen • identify and understand potential ethical problems during research process and ways • ability to distinguish research methods • develop and write a project report	
Teaching methods	**Lecture**	+
	Group discussion	+

Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		30
	Attendance	At each lesson	5
	Quizzes	4 quizzes during the semester	20
	Activity	During the semester	5
	Final Exam		40
	Others		
	Total		100

Policy	
	Preparation for class • The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions. **Withdrawal (pass/fail)** • This course strictly follows grading policy of the School of Science and Engineering. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year. **Cheating/plagiarism** • Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations. **Professional behavior guidelines** • The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. **Attendance** • Participation of students at all classis is important. Students should inform dean's office about missing lessons for particular reasons (illness, family issues and etc.). Students, missing more than 25% of lessons, are not allowed to take the exam. **Quizzes** • There will be a quiz examination per two weeks. The quizzes will be announced in the classroom two weeks before. Quiz is from homework problems. • The homework problems will be selected from questions and problems in the end • of each chapter. The No. of homework problems will be announced after finishing each chapter. **Activity** • Students who will be active during discussion of past lessons will be awarded with one activity mark.

Tentative Schedule

Week	Date/Day (tentative)	Topics	Textbook
1	19.09.25 26.09.25	Scientific Research: Concepts and Background. Introduction. Aims of science and scientific research. Distinction between science and cultures. Scientific versus cognitive method. Scientific Research Formulation and Literature Review: Problem Definition and Formulation; Literature Review; Characteristics of Good Research Question; Literature Review Process.	Chapter 1 [1] p. 1-30
2	03.10.25 10.10.25	Overview Of The Theory Of Science And History Of Scientific And Engineering Research. Introduction. What is Science?. Definitions by Goal and Process. What is Scientific Method? Socratic Method vs. Scientific Method. Criteria to Evaluate Theories. What is Knowledge? The Origins of Knowledge. The Role of Science in Knowledge Creation. Science and Truth. Science as Consensus. Critical Thinking. Primary & secondary data, Validity and Reliability of data collection procedures, data preparation, exploratory data analysis, parametric and nonparametric tests.	Chapter 2 [1] p. 31-80

3	17.10.25 24.10.24	Research Design-Need for Research Design; Features of a Good Design; Types of Research Designs; Induction and Deduction. Hypothesis Formulation and Testing-Hypothesis; Important Terms; Types of Research Hypothesis; Hypothesis Testing; Z-Test; t-Test; f-Test; Making a Decision; Types of Errors; ROC Graphics	Chapter 3 [1] p. 81-160
4	31.10.25 07.11.25	Qualitative and Quantitative Research: Qualitative research – Quantitative research - Concept of measurement, causality, generalization, replication. Merging the two approaches.	Chapter 4 [1] p. 161-220
5	14.11.25	Midterm	Chapter 5 [1] p. 221-330
6	21.11.25	Measurement of Scaling Concepts: Scales of measurements, nominal, ordinal, internal and ratio scales, Errors in measurements. Validity and Reliability in measurement, Scale Construction Techniques	Chapter 6 [1] p. 331-410
7	28.11.25 05.12.25	Report Writing: Discussions, Conclusion, referencing and various formats for reference writing, bibliography, Thesis Writing, Thesis writing, Formats of publications in research journals including subject classification, Impact factor, Citation index.	Chapter 7 [1] p. 411-460
8	12.12.25 19.12.25	Test Procedures-Parametric and Non Parametric Tests; ANOVA; Mann-Whitney Test; Kruskal-Wallis Test;Chi-Square Test; Multi-Variate Analysis.	Chapter 8 [1] p. 461-520
9	26.12.25	Presentation of the Research Work-Business Report; Technical Report; Research Report; General Tips for Writing Report; Presentation of Data; Oral Presentation; Bibliography and References; Intellectual Property Rights; Open-Access Initiatives; Plagiarism.	Chapter 9 [1] p.521-616
		Final Exam