

**The University of Jordan**  
**School of Engineering**  
**Mechanical Engineering Department**



<b>COURSE TITLE</b>	<b>Scientific Research (I)</b>	<b>COURSE CODE</b>	<b>0904906</b>
<b>LECTURER</b>	<b>Prof. Ahmed Al-Salaymeh</b>	<b>EMAIL: salaymeh@ju.edu.jo</b>	
<b>CREDIT HOURS</b>	<b>3</b>	<b>PRE-REQUISITE(S)</b>	<b>-</b>

**2025 COURSE CATALOG DESCRIPTION**

Literature research; development of a structure; selection of a methodical approach; definition of simplifications and assumptions; gaining of data; discussion of results; development of further investigations; writing of a report/paper; presentation of the results. In this course the students have to choose a topic about which they write a paper to deepen their knowledge.

**REFERENCES:**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.
6. Christensen, L.B., Johnson, R. B., and Turner, L. A., Research Methods, Design, and Analysis, Pearson.
7. Glasman-Deal, H., 2010. Science Research Writing: for Non-Native Speakers of English, Imperial College Press, London.
8. Hofmann, A. H., 2009. Scientific Writing and Communication: Papers, Proposals, and Presentations, Oxford University Press, USA.
9. Antony, J., 2003. Design of Experiments: for Engineers and Scientists, Elsevier Science & Technology Books.
10. Wayne C. Booth, W. C, Colomb, G. G., and Williams, J. M., 2003. The Craft of Research, University of Chicago Press, USA.
11. Bock, P., 2001. Getting It Right: R&D Methods for Science and Engineering, Academic Press.

**COURSE OBJECTIVES:**

1. Introducing types of research.
2. Research formulations and design.
3. Data collection and analysis.
4. Reporting and report/paper writing.
5. Research and publication ethics.
6. PhD proposal preparation and writing.

**COURSE LEARNING OUTCOMES:**

At the end of the course students will be able to:

1. Critically evaluate literature and formulate strong research question,
2. Design an ethical and robust methodology,
3. Develop comprehensive research proposal,
4. Independently conduct research and analyze data,
5. Effectively communicate findings; and critically reflect on the entire research process,
6. Engaging with the broader research community.
7. Writing research proposal and paper mathematical topics.

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**LEARNING/TEACHING METHODS:**

1. Lectures
2. Web-Based Scholarly Content
3. Seminars by students
4. Seminars by TUHH and UJ staff

**ASSIGNMENTS:**

1. Problem Solving.
2. Scholarly Research and Digital Source Exploration in Focused Areas.
3. Presentations.
4. Research proposals/paper

**ASSESSMENT:**

Mid-Term Exam	30%
Assignments and activities	30%
Final Exam	40%

**SYLLABUS PLAN:**

Week	Topic	Hrs.
1	Introduction to research methodologies; types of research; review of relevant literature searching techniques.	3
2	Critical literature review; identifying research gaps; formulating a strong research question; developing a preliminary research proposal outline	3
3	Refining research questions; ethical considerations in research; choosing appropriate research methods; defining study scope and limitations; initial literature review presentation.	3
4	Detailed methodology development; data collection methods (surveys, experiments, interviews etc.); defining variables and data analysis techniques.	3
5	Sampling techniques; pilot studies; data collection instrument design; refining the research proposal.	3
6	Research proposal workshops; peer review of proposals; feedback and revisions; finalize research proposals.	3
7	Begin data collection; address challenges in data gathering; discuss potential problems and solutions.	3
8	Mid-term Exam	3
9	Data cleaning and organization, data analysis techniques, interpretation of results, identifying trends and patterns; dealing with unexpected results.	3
10	Introduction to scientific writing; structuring research reports; effective communication of findings.	3
11	Report writing workshops; focusing on clarity, accuracy, and appropriate referencing; peer review of drafts.	3
12	Final report revisions and submission; preparing for presentations.	3
13	Research presentations; constructive feedback from peers and instructors; addressing questions and criticism.	3
14	Submission of research paper	3
15	Course wrap-up; final reflections on the research process; discussion of future research directions.	3
16	Final Exam	3