Definition document for the scientific research methodologies course (engineers)

Subject: Scientific Research Methodologies (Engineers) - Master's Degree in – Qualification and Specialization in Building Information Modeling

Dr.Eng. Bilal Maan Zaarour

Number of sessions: 12, one session (2 hours)

Subject summary:

This course presents the basic theories and concepts in the field of scientific research (definition, characteristics, and objectives). Scientific research skills, their importance, and the mechanism of enhancing them. Types of scientific research and its methods. The ability to write a scientific research plan, in addition, to provide the university students with the necessary skills to help them prepare research and scientific studies in all fields. Knowing the tools for collecting information, how to analyze it, and the usefulness of its results. Dealing with information sources and how to quote and document them. How to choose a research topic for researchers. Types of research papers and the structure of each. The mechanism of selecting the appropriate scientific journal for publication. Scientific article writing skills. The stages of processing the scientific article from submission to acceptance and publication. How to recognize the global achievements of researchers. As for the practical level, the course included practical exercises and activities carried out by the student to complete his scientific interest and to consolidate the theoretical frameworks of the subject.

Material code: …SRM…. the classes: **C1, C2**

Brief explanation	Chapter Title	Chapter No
-Introduction to scientific research, its concept, characteristics, skills of scientific research, its importance and the mechanism of its promotion, and the characteristics of the researcher.	The nature of scientific research	1
-Types of scientific research. -The concept and types of research methods.	Types and methods of scientific research	2
-Know the steps of scientific research. -Arranging the steps for preparing a scientific research plan. -Designing a research plan according to the steps of scientific research.	Scientific research plan	3
- Gathering, organizing, and recording information. -Analyzing information and concluding.	Data and information collection	4
-The definition of the research report, the conditions for its preparation, its components. - Introductory Information. - Body or text (theoretical framework). -Sources and references.	Writing a research report	5
- Basic concepts about libraries and their types.	The electronic library and the Internet and	6

-The Internet and its importance in the field of scientific research. Correct citation methods.	their role in the service of scientific research	
-The skills that the student must possess to choose his research topic. -Search skills for a specific topic using keywords.	How to choose a research topic for researchers	7
-Introducing the types of scientific journals and the difference between them. -Introducing the types of research papers and the difference between them. -The mechanism of selecting the appropriate scientific journal for publication.	Types of scientific journals and research papers and the structure of each	8
-What you need to know before writing. -The main components of each type of research paper. -Writing sequence. -Basics of writing a scientific article. -Common problems to be avoided in writing a research paper.	Research paper writing skills	9
-Steps for publishing the research paper with a detailed explanation of each step.	The stages of processing the research paper from submission to publication	10
-Identifying the most important international scientific sites with a detailed explanation of the importance of each of them: ORCID ID, Google Scholar, Publons, Researchgate, Web of Science, Kudos, Scopus,…	How to recognize the global achievements of researchers	11

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Outcomes:

Exam	Synchronous sessions	Homework	Learning Outcomes	Learning Outcomes
√	√		Knowing the basic concepts of scientific research, its objectives, characteristics, and motives.	**LO1**
√	√		Knowing the types and methods of scientific research. Distinguishing between scientific research methods and methods.	**LO2**
√	√	√	He/she can prepare a research plan in his field of specialization.	**LO3**
√	√		Knowing the tools for collecting information, how to analyze it, and the usefulness of its results.	**LO4**
√	√		He/ she can write a research report.	**LO5**
√	√	√	He/ she can deal with sources of information and how to quote and document them.	**LO6**
√	√	√	He/she can choose the research topic that best	**LO7**

			suits his abilities and time.	
√	√	√	Knowing the types of journals indexed globally. He can detect fake journals easily. Knows the types of research articles and the structure of each.	**LO8**
√	√	√	Writing a research paper in internationally indexed journals.	**LO9**
√	√	√	He/she can send the research paper for publication in the journal, with follow-up procedures until acceptance and publication.	**LO10**
√	√	√	He/she can create accounts in the most important international scientific sites.	**LO**11

Evaluation Criteria:

Evaluation Criteria To achieve the outcomes, the student must demonstrate the capabilities in:	Learning Outcomes
1- He/she knows knowledge, its divisions, and its sources. 2- Knowing science, its characteristics, and its objectives. 3- Differentiate between science and knowledge. 4- Explaining the concept of scientific research. 5- Listing the characteristics of scientific research. 6- Listing the motives for conducting research and studies. 7- He/she knows the skills of scientific research, their importance and the mechanism of enhancing them. 8- Listing the characteristics of the researcher. 9- Knowing the ethics and qualities of the researcher.	LO1
1- Classifying the types of scientific research. 2- Explaining the concept of scientific research methods. 3- Classifying scientific research methods. 4- Deducing the type of research method from scientific theses.	LO2
1- Listing the steps of scientific research. 2- Listing the steps for preparing a scientific research plan. 3- Showing the procedures for each step of the scientific research plan. 4- Designing a scientific research plan according to the steps of scientific research.	LO3
1- Listing the tools for collecting information.	LO4

2- It shows the nature of primary and secondary sources in scientific research. 3- Defining the questionnaire and identifies the steps required to complete it. 4- Explaining the concept of the interview and defines the steps for conducting it. 5- Knowing the observation and identifies the steps to make it. 6- Distinguishing between the advantages and disadvantages of the means of data collection. 7- He/she clarifies the nature of honesty and reliability in information gathering tools. 8- He/she knows the sample and explains the steps for selecting it. 9- Listing the types of samples and shows how to apply them. 10- Mentioning the methods of displaying information and data. 11- Extracting tools for collecting data and information from scientific theses.	
1- Knowing the research report. 2- It lists the conditions for preparing the research report. 3- Listing the components of the research report. 4- It shows the procedures and methods used in writing components search reports. 5- Fluent in using punctuation marks and abbreviations in writing the research. 6- It mentions the general rules for documenting the information of sources and references.	**LO5**

7- He/she mentions examples of appendices models that are needed by some research. 8- Preparing a report on the commitment of some researchers to write a research report in scientific messages .	
1- Knowing the concept and origin of the library. 2- Enumerating the types of libraries and their functions. 3- He/she knows the Internet. 4- Enumerating the areas of using the Internet in scientific research. 5- Showing the steps of searching in search engines. 6- He/she searches for previous studies that benefit his research.	**LO6**
1- It defines the research problem, its objectives, justifications, and its importance. 2- He/she chooses the topic that he finds his passion in. 3- Determining the appropriate topic for its capabilities and time. 4- Choosing from as many different new topics as possible. 5- Making sure that there is no similar research.	**LO7**
1- Knowing what are closed and open journals and the difference between them. 2- Knowing the types of research papers and distinguishes between them. 3- Knowing what is the impact factor of journals. 4- Knowing how to determine the strength of scientific journals. 5- Distinguishing between indexed and counterfeit journals.	**LO8**

1- He/she knows the components of research papers of all kinds. 2- Knowing the sequence of writing the research paper. 3- Knowing what should be written in each part of the research paper. 4- Knowing the important issues in writing the research paper. 5- Knowing what are the common problems that should be avoided in writing a research paper.	**LO9**
1- Knowing the stages of processing the scientific article from submission to acceptance. 2- Knowing the stages of processing the scientific article from acceptance to publication. 3- He/she can send the research paper to all indexed international journals.	**LO10**
Knowing the most important international scientific sites, the difference between them, the advantages of each site, and how to deal with it.	**LO11**

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Instructions:

Evidence generation: The student individually prepares a brief project in which he demonstrates his ability to understand the previous outcomes, and this is before he takes the exam and deals with:

•Develop a research plan for a topic of his choosing, including the main points that were mentioned within the course.

 •Writing a short article in a systematic, scientific, and fundamentally documented manner.

 •Create a personal account for each student in an internationally indexed scientific journal of his choice.

 ●Create an international scientific personal account for each student in one of the international scientific sites of his choice.

References:

1– طرق وأساليب البحث العلمي وأهم ركائزه: زينب الأشوح، القاهرة، المجموعة العربية للتدريب والنشر، ٢٠١٤.

2– الوجيز في مناهج البحث منظور إداري معاصر: عاصم محمد حسين الأعرج، عمان، دار الفكر، ١٩٩٥.

3– مناهج البحث العلمي: أحمد حسين الرفاعي، عمان، دار وائل، ١٩٩٩.

4– مناهج وطرائق البحث العلمي: إبراهيم عبد العزيز الدعيلج، الأردن، دار صفاء، ٢٠١٠.

5– مناهج البحث العلمي: محمد سرحان علي المحمودي، صنعاء، دار الكتب، ٢٠١٩.

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ثانياً- الكتب الأجنبية:

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1- Stokes, Peter. Research methods. Palgrave Macmillan, 2017.

2- Fellows, Richard F., and Anita MM Liu. Research methods for construction. John Wiley & Sons, 2015.

3- Esser, Frank, and Rens Vliegenthart. "Comparative research methods." The international encyclopedia of communication research methods (2017): 1-22.

4- Kelly, Anthony E., Richard A. Lesh, and John Y. Baek, eds. Handbook of design research methods in education: Innovations in science, technology, engineering, and mathematics learning and teaching. Routledge, 2014.

5- Borrego, Maura, Elliot P. Douglas, and Catherine T. Amelink. "Quantitative, qualitative, and mixed research methods in engineering education." Journal of Engineering education 98, no. 1 (2009): 53-66.

6-Queirós, André, Daniel Faria, and Fernando Almeida. "Strengths and limitations of qualitative and quantitative research methods." European Journal of Education Studies (2017).

Virtual meetings: The virtual meetings continue concurrently with the simultaneous sessions and listen to all the requirements of the students.

Suggestions for reading: Previously mentioned