ALTAMASH INSTITUTE OF DENTAL MEDICINE
(JINNAH SINDH MEDICAL UNIVERSITY)

Second year –Third year BDS
Longitudinal Theme: Research
Study Guide

Introduction:
This course is applicable for those who got admitted to AIDM BDS in 2022-23 onwards. This course offers knowledge and skill in planning, conducting and writing research to students. It provides them with not only information but also opportunities for team work and hands-on practice in research. This course has been added to the BDS program since University is firmly committed to the propagation of high quality research and also because it believes that all practitioners must have competence in research.

Outcomes:
By the end of the course, students will be able to submit a research manuscript to the concerned department such that the research work may be published in at least a local journal

Teaching and learning:
1. Interactive lectures (IL)
2. Practicals/Tutorials

Assessment tools:
1. Multiple Choice Questions: (MCQs)
- One Correct Type
- One Best Type

Departments Involved:
2nd year: Dental Material, Community Dentistry, Pathology, Pharmacology.
3rd year: Research Development and review cell and department of medical education.

S.No	Topic	Course Objectives: By the end of the course, 2nd year BDS students will be able to:	Teaching Method	Assessment Tool
1	**Importance of Research in Health**	• Discuss the importance of research in health care provision • Identify the problems related to health in the community	IL	MCQs

2	**How to Formulate a Research Question**	• Formulate scientifically correct research questions	IL	MCQs
3	**Hypothesis, its types and Errors in Hypothesis Testing**	• Classify hypotheses • Explain types of errors in hypothesis testing • Discuss how these errors can be prevented	IL	MCQs
4	**How to Perform Literature Search**	• Describe the terminology and Boolean Search • List the common search engines • List the steps of effective and efficient literature search	IL	MCQs
5	**Writing background and rationale of study**	• Explain the importance and characteristics of a scientifically acceptable background and rationale of the study • Write the background which should lead to the rationale for the study	IL	MCQs
6	**Writing Research Objectives, Inclusion and Exclusion Criteria and Operational Definitions**	• Explain the basic study designs used in research • Justify the selection of study designs for their own research questions	IL	MCQs
7	**Observational Analytical Study designs: Cross sectional studies**	• Explain the concept and purpose of cross-sectional study designs. • Identify the main characteristics of cross-sectional studies. • Analyze the advantages and disadvantages of cross-sectional studies • Interpret measures of association	IL	MCQs

8	**Observational Analytical Study designs: Case Control Studies and Odds Ratio**	• Explain the concept and purpose of Case Control Studies • Identify the main characteristics of Case Control Studies. • Analyze the advantages and disadvantages of Case Control Studies • Interpret measures of association	IL	MCQs
9	**Observational Analytical Study designs: Cohort Studies and Relative Risk**	• Explain the concept and purpose of Cohort Studies • Identify the main characteristics of Cohort Studies. • Analyze the advantages and disadvantages of Cohort Studies • Interpret measures of association	IL	MCQs
10	**Experimental Studies: Randomized Control Trials**	• Explain the concept and purpose of Randomized Control Trials • Identify the main characteristics of Randomized Control Trials • Analyze the advantages and disadvantages Randomized Control Trials • Interpret measures of association	IL	MCQs
11	**Experimental Studies: Quasi-Experimental Studies**	• Explain the concept and purpose of Quasi-Experimental Studies • Identify the main characteristics of Quasi-Experimental Studies • Analyze the advantages and disadvantages Quasi-Experimental Studies	IL	MCQs

		• Interpret measures of association		
12	**Estimating Sample Size**	• Describe the importance and methods of calculating sample size • Calculate sample size based on prescribed guidelines • Demonstrate the use of appropriate software for sample size estimation	IL	MCQs
13	**Sampling Techniques**	• Explain the Importance of Sampling • Differentiate between Probability and Non-Probability sampling • Describe types of Probability Sampling and Non Probability Sampling with Examples	IL	MCQs
14	**Designing a Questionnaire**	• Discuss steps of developing and using a questionnaire • Define validation and the most common methods of questionnaire validation	IL	MCQs
15	**Data Collection**	• Discuss various methods of data collection along with their advantages and disadvantages • Collect data by using the data collection instrument within the given timeline	IL	MCQs
16	**Project timeline and budget**	• List essential activities for the project timeline • List budget items and provide justification for a research project budget • Prepare a timeline and budget for their research project	IL	MCQs
17	**Guidelines on filling IRB Form**	• Explain the role and importance of the IRB in protecting research participants • Identify key components of the IRB application	IL	MCQs

		form.		
18	**Introduction to Biostatistics & SPSS / Types of Data**	• Describe Biostatistics • Discuss types of variables and data • Identify the main variables and the data types	IL	MCQs
19	**Basic concepts of Descriptive statistics**	• Define Descriptive statistics • Explain Central Tendency and the measures of Central Tendency • Discuss Dispersion and the measures of Dispersion • Describe Normal Distribution with Example • Define Skewness and Kurtosis	IL	MCQs
20	**Basic concepts of Inferential statistics**	• Explain Inferential Statistics • Explain sampling distributions, standard error, and confidence intervals.	IL	MCQs
21	**Writing Plan of Analysis**	• Develop a plan of analysis for different study designs	IL	MCQs
22	**Research Synopsis**	• Name the essential components of a research synopsis • Discuss the rationale for each of the main components	IL	MCQs
S.No	**Topic**	**Practicals:** By the end of the course, the 2nd year BDS students will be able to:	**Teaching Method**	**Assessment Tool**
1	**How to Perform Literature Search**	• Perform literature search by using Boolean Search	Tutorial	MCQs

2	**Writing Methodology Section**	• Write the methodology section of the study	Tutorial	MCQs
3	**Develop Consent form, Budget and Gantt Chart for Research Proposal**	• Draft a consent form for a hypothetical study. • Develop a budget for a sample research project. • Create a Gantt chart for the stages of a given research proposal.	Tutorial	MCQs
4	**Introduction to SPSS: Data Entry and coding of variables**	• Understand the SPSS interface and its basic features. • Enter raw data into SPSS and organize it for analysis. • Code and label variables appropriately for analysis.	Tutorial	MCQs
5	**Summarizing & Displaying Categorical Data: Frequency Tables and Graphs**	• Define categorical data and differentiate between nominal and ordinal data. • Identify appropriate graphical representations for categorical data	Tutorial	MCQs
6	**Concept of Normal and Skewed Distribution**	• Define scale data (interval and ratio) and explain its key characteristics. • Identify appropriate graphs for scale data • Recognize the significance of normal distribution in inferential statistics.	Tutorial	MCQs
7	**Summarizing Scale Data: Measures of Central Tendency**	• Define and distinguish between the three main measures of central tendency • Use the SPSS Frequencies command to	Tutorial	MCQs

		calculate mean, median, and mode for different variables • Generate and interpret graphical representations of central tendency in SPSS		
8	**Summarizing Scale Data: Measures of Dispersion**	• Generate standard deviation, variance, and range statistics using SPSS's Analyze menu • Export and format SPSS dispersion statistics output	Tutorial	MCQs
S.No	**Topic**	**Course Objectives:** By the end of the course, 3rd year BDS students will be able to:	**Teaching method**	**Assessment Tool**
1	**Introduction of Hypothesis Testing**	• Explain the concept of p-value in deciding about a hypothesis • List commonly used statistical tests when comparison in groups is based on quantitative data (comparison of mean) and qualitative data (comparison of proportions) • Describe the assumptions of applying non-parametric tests while comparing mean scores	IL	MCQs
2	**Hypothesis Testing for One Sample Mean**	• Describe the assumptions of applying T-Test for one sample mean • Interpret the findings of these tests using p-value	IL	MCQs
3	**Non Parametric Alternative for One Sample Mean**	• Describe the assumptions of applying T-Test for one sample mean (Wilcoxon Sign Rank Test) • Interpret the findings of these tests using p-	IL	MCQs

	(Wilcoxon Sign Rank Test)	value		
4	**Hypothesis Testing for One Sample Proportion**	• Describe the assumptions of applying T-Test for one sample proportion • Interpret the findings of these tests using p-value	IL	MCQs
5	**Hypothesis Testing for Means of 2 observations Paired Samples: Paired T Test**	• Describe the assumptions of applying Paired T Test for paired samples • Interpret the findings of these tests using p-value	IL	MCQs
6	**Non Parametric Alternative for Paired T Test (Wilcoxon Sign Rank Test)**	• Describe the assumptions of applying paired samples (Wilcoxon Sign Rank Test) • Interpret the findings of these tests using p-value	IL	MCQs
7	**Hypothesis Testing for Means of 2 Independent Samples: Independent T Test**	• Describe the assumptions of applying 2 sample Independent T Test • Interpret the findings of the test using p-value	IL	MCQs
8	**Non Parametric Alternative for Means 2 Independent Samples: Mann Whitney U Test**	• Describe the assumptions of applying Mann Whitney U Test • Interpret the findings of the test using p-value	IL	MCQs

9	**Hypothesis Testing for Proportions of Independent Samples: Chi-Square Test**	• Describe the assumptions of applying Chi-Square Test • Interpret the findings of the test using p-value	IL	MCQs
10	**Hypothesis Testing for Means of >2 Independent Samples: One Way ANOVA**	• Describe the assumptions of applying One Way ANOVA • Interpret the findings of the test using p-value	IL	MCQs
11	**Non-Parametric Alternative for Means of >2 Independent Samples: Kruskal Wallis Test**	• Describe the assumptions of applying Kruskal Wallis Test • Interpret the findings of the test using p-value	IL	MCQs
12	**Developing Tables**	• Describe how and why to develop tables and graphs • Develop relevant tables and graphs for data summarization	IL	MCQs
13	**Writing Results. Limitations & Discussion sections**	• Discuss the principles of writing results, limitations and discussion sections	IL	MCQs
14	**Threats to validity**	• Identify threats to internal and external validity in their projects	IL	MCQs
15	**Ethical Considerations in Research**	• Discuss ethical principles relevant to research • Write down the ethical consideration section	IL	MCQs

		for the synopsis and manuscript (e.g. confidentiality and anonymity) • Describe the process of taking informed written consent (where applicable) for their project		
16	**Critical analysis of a Research paper: Checklist**	• Explain the importance of critical appraisal of medical literature • Describe the guidelines of making a step wise Critical appraisal of published research	IL	MCQs
S.No	**Topic**	**Practicals:** By the end of the course, the 3rd year BDS students will be able to:	**Teaching Method**	**Assessment Tool**
1	**Referencing**	• Write references according to any one standard format	Tutorial	MCQs
2	**Data Analysis and Inferential Statistics**	• Analyse data by using relevant inferential statistics to test the hypotheses • Calculate central tendency and dispersion of data, where applicable	Tutorial	MCQs
3	**Writing Results. Limitations & Discussion sections**	• Write results, discussion, limitations and conclusion sections for the manuscript based on prescribed guidelines	Tutorial	MCQs

Reading Sources:

Reading Material:

Will be provided by community dentistry in 2nd year and Research Development & Review Cell (RDRC) in 3rd year

Internet resources: With easy excess to digital library students will use internet resources with added time flexibility to enrich and update their knowledge and application.

Library: It provides wealth of resources, space to study alone or in a group. It also provide world of books to discover and borrow.

Assessment Criteria:

Knowledge:

- 80 MCQs (Multiple Choice Questions) are used to assess objectives covered in each module.
- A MCQ has a statement or clinical scenario followed by four options (likely answer).
- Students after reading the statement/scenario select ONE, the most appropriate response from the given list of options.
- Correct answer carries one mark, and incorrect 'zero mark'. There is no negative marking.
- Students mark their responses on an answer sheet provided by examination department.

AIDM Internal Assessment Policy

Students will be assessed to determine achievement of learning objectives through the following:

- Midterm Examination will be scheduled on completion of half of the course
- Mock Examination will be scheduled on completion of whole course
- The method of examination comprises theory exam which includes MCQs and Research Project submission in the end of the 3rd year.
- Student's behaviors and attitudes will be observed during all academic activities.

Annual Examination:

- Internal assessments Marks of both the years, will constitute 20% weightage as per JSMU policy.
- University Annual examination will be based on MCQs.

Attempts:

There are unlimited attempts in the final professional examination only.

Course Evaluation:

- Pass/fail ratio of continuous and summative assessments will be evaluated.
- 75% attendance is mandatory to be eligible for annual professional examination
- Feedback will be taken
  - Regarding course from students and faculty
  - Student feedback regarding faculty
  - Faculty feedback of students

For queries:

RDRC members:

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