In the Name of God

Hamadan University of Medical Sciences and Health Services

Educational Deputy of the University

Center for Studies and Development of Medical Sciences Education

Theory/Practical Lesson Plan Form

Dear Colleague,
As the teaching-learning process is one that cannot achieve its goals without planning, it is essential to develop a lesson plan at the beginning of the educational process (as a map and guide for instructors and students). This is considered one of the main tools for the educational activities of instructors. Therefore, we kindly ask the esteemed instructors to exercise utmost care in completing the lesson plan.

- **Course Title:** Medical Statistics
- **Instructor:** Elham Khanlarzadeh
- **Course Coordinator:** Elham Khanlarzadeh
- **Department Head:** Dr. Farzaneh Asna-Ashari
- **Credits (Type and Amount):**
    - Theoretical: 1 credit
    - Practical: [Not applicable]
- **Student Major/Level:** Clinical Preliminaries
    - **Course Schedule:** Second semester, Academic Year 1First Semester: ✔
    - Second Semester: ✔
- **Teaching Location:** Medical School Classroom

Medical Statistics - Session Plan

Session	Topic / Title*	Intended Learning Outcomes (ILOs): By the end of the session, students should be able to…	Learning Domain	Teaching Methods	Duration	Teaching Aids	Assessment Methods
1	Descriptive Statistics (Data	• Understand the	Cognitive	Lecture Problem-based	1 hr	PowerPoint	Formative (Self-test, short answer questions)

	Description, Measures of Central Tendency and Dispersion)	importance of statistics in medicine. • Explain the application of statistics in medicine. • Define measures of central tendency and dispersion. • Calculate the mean, median, and mode. • Describe the characteristics of each measure of central tendency and explain their differences. • List the types of dispersion measures. • Calculate the standard deviation, range, variance, and coefficient of variation. • Describe the characteristics and differences among the	Cognitive	Exercise Q&A Participation			Summative (Final: MCQ exam End of session assignment

		measures of dispersion. • Explain how to use measures of central tendency and dispersion in presenting research results. • Know how to report different types of data. • Understand the application of charts in medicine and how to construct different types of charts. • Recognize the use of statistical software in descriptive statistics.					
2	Concepts and Calculations in Normal & Standard Normal Distribution	• Define the normal distribution. • Describe the properties of the normal distribution. • Calculate probabilities using the	Cognitive Cognitive Psychomotor Cognitive	Lecture Problem-based Exercise Q&A Participation	1 hr	PowerPoint	Formative (Short answer questionsSummative (MCQ examEnd of session assignment

		normal distribution. • Define the standard normal distribution. • Describe the properties of the standard normal distribution. • Explain how to use the z-table. • Calculate the area under the curve using the z-table.	Cognitive Cognitive Cognitive Cognitive				
3	Estimation of Confidence Intervals for Mean & Proportion	- Define 'estimation' and its concept > - Explain parameter and statistic- Calculate point and interval estimates for mean. - Calculate point and interval estimates for proportion- Explain the concept of standard error- Calculate standard error.	Cognitive Cognitive Psychomotor Psychomotor Cognitive Psychomotor	Lecture Problem-based Exercise Q&A Participation	1 hr	PowerPoint	Formative (Short answer questions) > Summative (MCQ exam) End of session assignment
4	Types of Hypotheses, Statistical	• Define estimation	Cognitive	Lecture Problem	1 hr	PowerPoint	Formative (Short answer questions)<br

	Errors, Hypothesis Testing (Difference of Mean/Proportion from a Constant), Application of Statistical Software	and explain its concept. • Define and explain the terms parameter and statistic. • Calculate point and interval estimates for the mean. • Calculate point and interval estimates for the proportion. • Explain the concept of standard error. • Calculate the standard error.	Cognitive Cognitive Cognitive Cognitive Psychomotor Cognitive Psychomotor	-based Exercise Q&A Participation			> Summative (MCQ exam) End of session assignment
5	Hypothesis Testing (Difference of Means/Proportions), Application of Statistical Software	- Explain application of t-tests for difference of means and proportions. Calculate degrees of freedom for the t-testCalculate pooled variance. Explain and conduct paired t-test - Perform calculations for paired t-testsInterpret	Cognitive Psychomotor Psychomotor Cognitive Psychomotor Cognitive Cognitive	Lecture Problem-based Exercise Q&A Participation	1 hr	PowerPoint	Formative (Short answer questions) Summative (MCQ exam) End of session assignment

		resultsApply statistical software for these tests - Interpret software outputs.	Cognitive				
6	Chi-Square Test, Correlation, and Application of Statistical Software	- Explain use of chi-square test - Construct contingency tables for qualitative variables - Write appropriate hypotheses - Carry out the steps of the chi-square test degrees of freedom Explain observed and expected frequencies - Calculate expected frequency in contingency tables. - Interpret chi-square results Name assumptions of the chi-square test Explain application of Fisher's and Pearson's	Cognitive Psychomotor Psychomotor Psychomotor Cognitive Cognitive Psychomotor Cognitive Cognitive Cognitive Cognitive Cognitive Psychomotor Cognitive Psychomotor Cognitive	Lecture Problem-based Exercise Q&A Participation	1 hr	PowerPoint	Formative (Short answer questions) Summative (MCQ exam) End of session assignment

		correlation tests - Distinguish use of Pearson correlation by data type - State related research hypotheses - Explain use of scatter plots. - Calculate Pearson's coefficient - Interpret correlation coefficient.					
7	Probability: Types and Applications in Medicine, Binomial and Poisson Distributions	• Define probability. • Name the types of probability and explain the rules of probability. • Calculate simple probability. • Calculate compound probability. • Calculate the product and sum rules of probability in the case of independent and dependent events.	Cognitive Cognitive Psychomotor Psychomotor Cognitive Cognitive Cognitive Cognitive Cognitive Psychomotor	Lecture Problem-based Exercise Q&A Participation	1 hr	PowerPoint	Formative (Short answer questions) Summative (MCQ exam) End of session assignment

		• Define probability distribution. • Define the binomial distribution. • Define the Poisson distribution. • Explain the application of the binomial distribution in data analysis. • Explain the application of the Poisson distribution in data analysis. • Calculate the probabilities for the binomial and Poisson distribution					
8	Sample Size Determination for Research	- Understand the importance of correct sample size selection. - State factors affecting sample size estimation. - Calculate sample size for estimating a	Attitudinal Cognitive Psychomotor Psychomotor Psychomotor Psychomotor	Lecture Problem-based Exercise Q&A Participation			

		mean. - Calculate sample size for estimating a proportion. - Calculate sample size for difference in means and proportions. - Calculate sample size for correlation studies.					

Assessment Scheme

Assessment Type	**Assessment Tool/Method**	**Points**
Quiz 1 (Self-test, with written solutions)	Quiz (Short answer)	3
Assignment at the end of each session	Project Presentation	2
Mid-term Exam	Multiple Choice Questions (MCQ)	15
Final Exam	—	—
Other	Active participation, attendance, verification of reading	—
Total		**20**

References:

- *Introduction to Biostatistics and Research Methods*, Fifth Edition