UNIVERSITY of NICOSIA | MEDICAL SCHOOL

Course Title	**Advanced quantitative data analysis for Medical Sciences**				
Course Code	PHD-103				
Course Type	Required Elective				
Level	3rd cycle				
Year / Semester	Year 1, Semester 2				
Teacher's Name	Course Lead: Dr Nicoletta Nicolaou Contributor of course material / content: Dr Christiana Demetriou				
ECTS	10	**Lectures**	1 per week	**Tutorials / workshops**	0 – 1 per week
Course Purpose and Objectives	The main objectives of the course are to: • Illustrate how the different types of data involved in medical research determine the methods for their statistical analysis. • Articulate the basic principles of probability, random error, statistical significance, study power, Type I and Type II errors. • Introduce students to statistical software and train them on how to load, clean, modify, manage, and analyze data. • Equip students with the analytical and critical thinking skills for performing basic descriptive analysis of quantitative variables including statistical adjustment for confounding, as well as identification of interactions and effect mediations. • Equip students with the analytical and critical thinking skills to perform analysis for determining associations with quantitative variables.				
Learning Outcomes	After completion of the course students are expected to be able to: 1. Appraise the different types of variables in medical research and the different frequency distributions including the normal distribution and its statistical qualities. 2. Critically apply and interpret random error, statistical significance (p-value and Confidence Intervals), study power, and Type I and II errors. 3. Load, clean, modify, and manage data in a statistical software programme. 4. Derive and report appropriate descriptive statistics for different research scenarios. 5. Use a statistical software package to calculate and interpret appropriate basic summary statistics (mean, median, standard deviation, interquartile range, proportions, risk and rate). 6. Critically apply the concept of the dependent and the independent variable to identify appropriate analytic statistics for determining the presence of associations. 7. Use a statistical software package to calculate and interpret measures of association for quantitative variables (t-test, ANOVA). 8. Use a statistical software package to calculate and interpret measures of association for quantitative variables (scatterplots and correlation analysis).				

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<tr><td></td><td colspan="3">9. Use a statistical software package to calculate and interpret measures of association for categorical variables (chi-squared test).
10. Use a statistical software package to calculate and interpret measures of association using non-parametric statistical tests.
11. Use a statistical software package to perform and interpret the results of linear regression analysis for analysing numeric outcomes.
12. Use a statistical software package to perform and interpret the results of multiple regression analysis for analysing numeric outcomes.
13. Use a statistical software package to perform and interpret the results of logistic univariable and multivariable regression analysis for analysing binary outcomes.
14. Use a statistical software package to determine interactions in linear and logistic regression analysis.
15. Use a statistical software package to determine confounding and effect mediations in linear and logistic regression analysis.</td></tr>
<tr><td>Prerequisites</td><td>PHD-101</td><td>Required</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">1. Introduction to measurement: types of variables and types of distributions
2. Introduction to statistical analysis in Medical Sciences
3. Introduction to SPSS (or Jamovi) statistical software programme
4. Descriptive analysis of numeric data: mean, median, standard deviation, interquartile range, histograms, box –plots
5. Descriptive analysis of categorical data: proportions, risk and rate.
6. Basic analysis for determining associations with numeric outcomes I: T-test and ANOVA.
7. Basic analysis for determining associations with numeric outcomes II: Scatterplots and correlation analysis.
8. Basic analysis for determining associations with categorical outcomes: Chi-squared.
9. Non-parametric statistical tests
10. Linear regression analysis
11. Multiple regression analysis
12. Univariable and Multivariable Logistic regression analysis
13. Assessing interactions using Linear and Logistic regression analysis
14. Assessing confounding and mediation using Linear and Logistic regression analysis</td></tr>
<tr><td>Teaching Methodology</td><td colspan="3">The teaching methodology is a mixture of taught lectures and tutorials, as well as directed self-learning.</td></tr>
<tr><td>Bibliography</td><td colspan="3">Required Textbooks / Reading:
<table>
<tr><th>Title</th><th>Author(s)</th><th>Publisher</th><th>Year</th><th>ISBN</th></tr>
<tr><td>An Introduction to Medical</td><td>Bland M.</td><td>Oxford Medical Publications</td><td>2015</td><td>9780199589920, 9780191002</td></tr>
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	Statistics (4th ed.)				991, 9780192518392.
	Oxford Handbook of Medical Statistics (2nd ed.)	Peacock & Peacock	Oxford University Press	2020	9780191803208

Recommended Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Essential Medical Statistics (2nd ed.)	Kirkwood B. Sterne J.	Blackwell Scientific	2003	0865428719
Introduction to Health Research Methods: A Practical Guide	KH Jacobsen	Jones & Bartlett Learning	2021	978-1-2841-9763-1

Assessment	This pass/fail course will be assessed at the end of Semester 2 with a summative assessment comprising the submission of a research article. Formative assessment will include submission of worksheets following the workshops / tutorials (where applicable).
Language	English