

DEREE COLLEGE SYLLABUS FOR: : MA 2025 APPLIED STATISTICS FOR SCIENCES					
(Spring 2020)	UK LEVEL 4 UK CREDITS: 15 US CREDITS: 3/1/3				
PREREQUISITES:	None				
CATALOG DESCRIPTION:	A comprehensive introduction of statistics for the natural and physical sciences. Organizing and summarizing data. Descriptive and inferential statistics. Test for independence of two qualitative/categorical variables. Test of differences for related/ unrelated samples using parametric or non-parametric tests. Analysis of variance (ANOVA), correlation relationships and linear regression analysis. Consider applications in the sciences using software.				
RATIONALE:	This course provides the elementary foundations in statistics and its application to the sciences, aiming primarily to focus on how statistics is integrated into modern scientific practice in biomedicine and other related areas. The students learn to summarize and describe data, construct confidence intervals, and perform basic tests of hypotheses as well as linear regression, analysis of variance.				
LEARNING OUTCOMES:	<p>As a result of taking this course, the student should be able to:</p> <ol style="list-style-type: none"> 1. Develop the necessary statistical skills to describe population or sample data and estimate the probability of random events using probability distributions. 2. Identify appropriate statistical tests to draw inference about the population mean(s) from one or more samples. 3. Apply appropriate statistical procedures for qualitative/ categorical data. 4. Apply regression techniques for prediction. 5. Utilize open-source data analysis tools to illustrate applications for the life sciences. 6. Utilize statistical software for data presentation and data analysis. 				
METHOD OF TEACHING AND LEARNING:	<p>In congruence with the teaching and learning strategy of the college, the following tools are used:</p> <ul style="list-style-type: none"> ➤ Classes consist of lectures, question-answer periods, homework solution and practice sessions through software that enhance understanding the material through real world empirical problems and self- testing assignments. ➤ Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. ➤ Use of a Blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. 				
ASSESSMENT:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: left;">Summative:</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"> First assessment a) In- class midterm, (1 hour), 30 % (Numerical problems/ questions using statistical output) b) Take-home Project 1, 10% (Statistical analysis using software/ interpretation of results) </td> <td style="text-align: right; vertical-align: top; padding: 5px;">40%</td> </tr> </tbody> </table>	Summative:		First assessment a) In- class midterm, (1 hour), 30 % (Numerical problems/ questions using statistical output) b) Take-home Project 1, 10% (Statistical analysis using software/ interpretation of results)	40%
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<p>READING LIST:</p>	<p>REQUIRED MATERIAL: Samuels, M.L., Witmer, J.A. & Schaffner, A (2015) <i>Statistics for the Life sciences</i> (5th Ed.), Pearson.</p> <p>RECOMMENDED READING:</p> <ul style="list-style-type: none"> • Instructor hand-outs. • Books on reserve in the library. <p>FURTHER READING: Hawkins, D (2019) <i>Biomeasurement: A student's guide to Biostatistics</i> (4th Ed.), Oxford University Press.</p> <p>Holmes, S. & Huber, W. (2019) <i>Modern Statistics for Biology</i>, Stanford edu. online</p> <p>Ennos, R. & Johnson M.L. (2018) <i>Statistical data and handling skills in Biology</i> (4th Ed.) Pearson Education Ltd.</p> <p>Field A. (2017). <i>Discovering statistics with SPSS</i> (5th Ed.). London, UK: Sage Publications.</p> <p>Irizarry, R.A. & Love, M.I. (2016) <i>Data analysis for the life sciences with R</i> (1st Ed.). Chapman and Hall/CRC</p> <p>George, D. & Mallery, G (2016). <i>IBM SPSS Statistics 23 Step by Step: A Simple Guide and Reference</i> (14th Ed.). New York, NY: Routledge.</p> <p>Hinton, P.R. (2014). <i>Statistics Explained</i> (3rd Ed.). Statistics Explained. New York, NY: Routledge.</p>						

	Leech, N. L., Barrett, K. C. & Morgan, G. A. (2008). <i>SPSS for Intermediate Statistics</i> (3rd Ed). New York, USA: Taylor & Francis Group.
JOURNALS:	RECOMMENDED MATERIAL Journal of Applied Statistics Journal of the American Statistical Association Journal of the Royal Statistical Society Series C (Applied Statistics) PLoS (Public Library of Science) One Proceedings of the National Academy of Sciences of the United States of America Science
COMMUNICATION REQUIREMENTS:	Assignments presented in Microsoft Word. Use of proper English, both oral and written.
SOFTWARE REQUIREMENTS:	Blackboard Excel and/or SPSS or other statistical software (e.g. R and Bioconductor).
WWW RESOURCES:	www.wolframalpha.com www.quickmath.com https://www.biostars.org https://www.itl.nist.gov/div898/handbook/ https://www.significancemagazine.com https://www.rstudio.com https://www.knime.com APA style resources available from: http://www.psychwww.com/resource/apacrib.htm http://www.wooster.edu/psychology/apa---crib.html http://owl.english.purdue.edu/workshops/hypertext/apa/index.html
INDICATIVE CONTENT:	<ol style="list-style-type: none"> 1. Descriptive statistics <ol style="list-style-type: none"> a. Location measures b. Dispersion measures c. Frequency distributions d. Graphical representation e. Applications using statistical software 2. Probability distributions/ Sampling distributions <ol style="list-style-type: none"> a. Basic probability concepts b. Binomial distribution c. Normal distribution d. Sample mean and variance e. Central limit theorem 3. Confidence intervals <ol style="list-style-type: none"> a. Confidence interval for one mean b. Confidence intervals for the difference of two means c. Applications using statistical software 4. Comparison of independent/dependent samples <ol style="list-style-type: none"> a. Parametric and non-parametric tests b. Applications using statistical software 5. Chi-square tests for categorical data <ol style="list-style-type: none"> a. One-sample distributions b. Chi-square test for independence 6. Comparing the means of more than two samples <ol style="list-style-type: none"> a. One-way analysis of variance (ANOVA) b. Applications using statistical software

	<ul style="list-style-type: none">7. Linear regression and correlation<ul style="list-style-type: none">a. The correlation coefficient, the coefficient of determination and the test of linear relationship between two variables.b. Use linear regression as a prediction tool.c. Applications using statistical software8. [Optional as time permits] Generalised linear modelling: an introduction.
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