

## Course Description

### MEDD8910 Introduction to Regression Analysis and Data Visualisation

| Course description  |  |  |                                    |
|---|--|--|------------------------------------|
| <p>This course will cover a number of regression methods and data visualisation using R. The emphasis will be on how to do data analysis using R as well as how to present and interpret the results from regression analysis. The topics include 1) R programming and visualisation, 2) descriptive statistics, 3) correlation and causation, 4) hypothesis testing, 5) simple regression, 6) multiple regression, 7) categorical predictors, and 8) interactions and quadratic effects. This course will illustrate how to use R software to carry out most statistical analyses and graphics covered in this course.</p> |  |  |                                    |
| <p><b>Coursework / Examination ratio:</b> <u>100</u> % Coursework, <u>0</u> % Examination</p>   |  |  |                                    |
| Course objectives   |  |  |                                    |
| <p>This course aims to prepare students with fundamental knowledge and skills necessary to perform regression analyses using R, to interpret the results from the analyses, to effectively present results in tables and figures, and to apply appropriate strategies to address questions that arise in educational research and practice.</p>   |  |  |                                    |
| Course learning outcomes (CLOs)   |  | Aligned programme learning outcomes (PLOs) |                                    |
| 1. Install, code, and use R programming language in R studio to perform statistical analyses and data visualisation   |  | PLOs 1, 2, 3                               |                                    |
| 2. Demonstrate a fundamental understanding of regression analysis in educational research   |  | PLOs 1, 2                                  |                                    |
| 3. Conduct regression analyses and effectively present results through reflecting on important educational values, such as equity and social justice  |  | PLOs 1, 2, 3, 4                            |                                    |
| 4. Read, interpret, and critically evaluate statistical methodology, outcomes and interpretations found in educational research   |  | PLOs 4, 5                                  |                                    |
| Course assessment methods   |  |  |                                    |
| Assessment method   | Type of assessment (e.g. description of assignment)  | Weighting (%)                              | Aligned course learning outcome(s) |
| Homework (2)  | Individual   | 30   | CLOs 1-4                           |
| Group assignment (2)  | Group  | 30   | CLOs 1-4                           |
| Final project   | Individual   | 40   | CLOs 1-4                           |
| Course content and topics   |  |  |                                    |
| <b>Session 1</b>  | Introduction to R programming 1 (R language)<br>Introduction to diverse publicly available education datasets<br>Basic terminology in statistics |  |                                    |
| <b>Session 2</b>  | Introduction to R programming 2 (R packages, including psych, sm, ggplot2)<br>Descriptive statistics<br>Correlation analysis                     |  |                                    |
| <b>Session 3</b>  | <i>p</i> -values and hypothesis testing<br>The basics of simple regression 1 (assumptions)   |  |                                    |
| <b>Session 4</b>  | The basics of simple regression 2 (inference)<br>Outlier   |  |                                    |
| <b>Session 5</b>  | The basics of multiple regression 1<br>Scaling and transformation  |  |                                    |
| <b>Session 6</b>  | The basics of multiple regression 2<br>The coding procedure to create categorical variables for students' different demographic characteristics  |  |                                    |
| <b>Session 7</b>  | The use of categorical predictors for educational equity   |  |                                    |

|  |   |
|--|---|
| <b>Session 8</b>   | Interaction effects and quadratic effects<br>Course wrap-up |
| <b>Required / recommended readings and online materials</b>  |   |
| <p>Azar, B. (2006) Discussing your findings. <a href="http://www.apa.org/gradpsych/2006/01/findings.aspx">http://www.apa.org/gradpsych/2006/01/findings.aspx</a></p> <p>Berkman, M. B., &amp; Plutzer, E. (2004). Gray peril or loyal support? The effects of the elderly on educational expenditures. <i>Social Science Quarterly</i>, 85(5), 1–16.</p> <p>Chang, W. (2012). <i>R graphics cookbook</i>. O'Reilly.</p> <p>Cooper, H. (2010). <i>Reporting research in psychology: How to meet journal article reporting standards</i>. American Psychological Association.</p> <p>Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. <i>Psychometrika</i>, 16(3), 297-334.</p> <p>Goodwin, L. D., &amp; Leech, N. L. (2006). Understanding correlation: Factors that affect the size of r. <i>Journal of Experimental Education</i>, 74(3), 251–266.</p> <p>Gopen, G., &amp; Swan, J. (1990). The science of scientific writing: If the reader is to grasp what the writer means, the writer must understand what the reader needs. <i>American Scientist</i>, 78, 550– 558.</p> <p>Jang, S. T. (2018). The implications of intersectionality on Southeast Asian female students' educational outcomes in the United States: A critical quantitative intersectionality analysis. <i>American Educational Research Journal</i>, 55(6), 1268-1306.</p> <p>Jang, S. T. (2020). The schooling experiences and aspirations of students belonging to intersecting marginalisations based on race or ethnicity, sexuality, and socioeconomic status. <i>Race Ethnicity and Education</i>. Advance online publication. doi: 10/1080/13613324.2020.1842350</p> <p>Jang, S. T., Halse, C., Lee, D. H. L., &amp; Hon, Q. C. K. (2021). Belongingness and national belonging among youth in Hong Kong. <i>Youth &amp; Society</i>. Advance online publication. doi: 10.1177/0044118X211022393</p> <p>Kim, J., &amp; Mueller, C. W. (1978). <i>Introduction to factor analysis: What it is and how to do it</i>. SAGE Series: Quantitative Applications in the Social Sciences #13.</p> <p>Kutner, M., Nachtsheim, C., Neter, J., &amp; Li, W. (2005). <i>Applied linear statistical models</i>. McGraw Hill/Irwin.</p> <p>Nicol, A. A., &amp; Pexman, P. M. (2010). <i>Displaying your findings: A practical guide for creating figures, posters, and presentations</i>. American Psychological Association.</p> <p>Verbeke, G., &amp; Mollenberghs, G. (2000). <i>Linear mixed models for longitudinal data</i>. Springer-Verlag.</p> <p>Wendorf, C. A. (2004). Primer on multiple regression coding: Common forms and the additional case of repeated contrasts. <i>Understanding Statistics</i>, 3(1), 47–57.</p> |   |
| <b>Other additional course information</b>   |   |
| With Advanced Research Course (ARM)  |   |