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| **PGR Course unit outline 2020/21** | | |
| **Unit code:** | **BMAN80502** | |
| **Title:** | **Structural Equation Modelling** | |
| **Credit value:** | **5** | |
| **Semester:** | **2** | |
| **Course Coordinator**  **contact details:** | Prof. Paul Irwing, Room 7.005, Tel. 0161-8323872/63419, Email: paul.irwing@manchester.ac.uk | |
| **Other staff involved contact details:** | N/A | |
| **Pre-requisites**  **Dependent course units** | Students on this course must also have completed the prior courses on factor analysis and multiple regression or equivalent. To ensure that previous courses have covered equivalent material this should be discussed with the course tutor  Introduction to Hierarchical Linear Modelling with HLM | |
| **Course unit overview** | | |
| Confirmatory factor and structural models arguably form the strongest currently available basis for all advanced multivariate analyses, including for example multi-level models and longitudinal data analysis. This course will provide a basic introduction to both types of model. | | |
| **Aims** | | |
| Most quantitative studies in business involve the measurement of multiple latent variables at either one or multiple points in time. Currently, the most widely accepted analyses of such data depend on structural equation models of various types, the most basic of which are confirmatory factor models and path models. This course will introduce students to such models and provide them with the practical skills to analyse such models in Mplus. | | |
| **Objectives (Learning outcomes)** | | |
| *On completion of this unit successful students will be able to:*   * Understand the basic principles of structural equation modelling * Carry out a confirmatory factor analysis * Test simple path models * Acquire a basic mastery of SEM as implemented in Mplus * Apply these basic principles to publishable data sets * Know how to report SEM analyses in journal style | | |
| **Syllabus content** | | |
| * Sample and model implied covariance matrices * Classical test theory * Confirmatory factor analysis and the concept of latent variables * Path models * Fit statistics and cut-off criteria * Strategies for testing and fitting models. * Estimators. * Identification. * Mplus code. * Writing up SEM analyses in journal style | | |
| **Methods of delivery** | | |
| **Lectures** | | **6 hours.** The course will be delivered over two consecutive days |
| **Seminar/Tutorial/Workshop/Lab Hours** | | **6 hours** |
| **Independent Study** | | **38 hours** |
| **Total Study Hours** | | **50 hours** |
| **Reading List** | | |
| **Pre Reading**: Tokarev, A., Phillips, A.R., Hughes, D.J., & Irwing, P. (2017). Leader dark traits, workplace bullying, and employee depression: Exploring mediation and the role of the dark core. Journal of Abnormal Psychology, 126, 911-920. http://psycnet.apa.org/doiLanding?doi=10.1037%2Fabn0000299  Bollen, K. A. (2002). Latent variables in psychology and the social sciences. Annual review of psychology, 53, 605-634. 2  **Core Texts:**  **Basic Introduction**  Little, T. D. (2013). Longitudinal Structural Equation Modeling. New York, NJ: The Guiford Press. Chapters 1,3,4 and 9.  Hair, J. F., Jr., Anderson, R. E., Tatham, R. L. & Black, W. C. (2006). Multivariate Data Analysis. Upper Saddle River, NJ: Prentice-Hall.  **Supplementary Texts:**  **Underlying theory - Introductory**  Kline, R. B. (2005). Principles and Practice of Structural Equation Modelling. London: The Guilford Press.  Loehlin, J. (2004). Latent Variable Models: An Introduction to Factor, Path and Structural Equation Analysis. Lawrence Erlbaum Associates.  **SEM using Mplus**  Kelloway, E. K. (2015). Using Mplus for Structural Equation Modeling. Sage: London.  Geiser, C. (2013). Data Analysis with Mplus. New York: Guilford Press.  **Underlying theory – Advanced**  Bollen, K. A. (1989). *Structural Equations with Latent Variables.* New York: Wiley.  **Selected References**  **Analysis strategies**  Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modelling in practice – A review and recommended 2-step approach. Psychological Bulletin, 103, 411-423.  Jöreskog, K. G. (1993). Testing structural equation models. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 294-316). London: Sage.  Tomarken, A. J., & Waller, N. G. (2003). Potential problems with “well fitting” models. *Journal of Abnormal Psychology*, 112, 578-598.  **Estimation**  Flora, D. B., & Curran, P. J. (2004). An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychological Methods*, 4, 466-491.  **Fit**  Hu, L.T., & Bentler, P.M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3,* 424–453.  Hu, L.T., & Bentler, P. M. (1999). Cut-off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6,* 1–55.  Marsh, H. W., Hau, K.-T., Grayson, D. (2005). Goodness of fit in structural equation models. In A. Maydeu-Olivares & J. J. McCardle (Eds.), *Contemporary psychometrics: A festshrift for Roberick P. McDonald* (pp. 275-340). Mahwah, NJ: Erlbaum.  Schermelleh-Engel, K., Moosbrugger, H., & Muller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures. *Methods of Psychological Research, 8,* 23-74.  Yuan, K.-H. (2005). Fit indices versus test statistics. *Multivariate Behavioral Research*, *40*, 115-148.  **Parcelling**  Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To Parcel or Not to Parcel: Exploring the Question, Weighing the Merits. *Structural Equation Modeling, 9,* 151-173.  **Item level factor analysis**  Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: Current approaches and future directions. *Psychological Methods*, 12, 58-79.  **Supplementary Text**: to indicate any supplementary readings for the course | | |
| **Assessment** | | |

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| **Mode of Assessment** | **Length required** | **Weighting within unit** |
| |  |  |  | | --- | --- | --- | | This will comprise a write up of the class exercises in the form of a journal article. | 3,500 words | 100% | |  |  |
| **Assessment is for those requiring unit credits (please make this clear to the tutor at the start of the elective)**  **Coursework**  PGRs may take this elective as a stand-alone assessed 5 credit module providing they have completed the equivalent pre-requisites. In this case they will complete a 1500 word assignment based on SEM. If this elective is taken alongside EFA the combined assignment should be 2,500 words in length for 10 credits. If the three electives are taken together then the 15 credit assignment length will be 3000 words.  . | 1,500, 2,500 or 3,000 words (see opposite) | 100% |

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| **Feedback methods** |
| PGRs are encouraged to express any constructive comments or to seek help and advice from the individual lecturers involved. At the end of the semester there will be the opportunity to give feedback on the course by means of a feedback questionnaire. In addition there will be a group presentation in which both PGRs and staff will provide constructive feedback. For the coursework, there is a standard template which specifies the exact criteria used to assess the coursework. At the end of the course an exemplary piece of coursework will be posted on Blackboard. |