

Course Outline

Part I

Programme Title	: Doctor of Education
Programme QF Level	: 7
Course Title	: Rasch Measurement for Educational Research II: Advanced Methods
Course Code	: EMA8003
Department	: Psychology
Credit Points	: 3
Contact Hours	: 39
Pre-requisite(s)	: Rasch Measurement for Educational Research I: Scale Building (or equivalent)
Medium of Instruction	: EMI
Course Level	: 8

Part II

The University's Graduate Attributes and seven Generic Intended Learning Outcomes (GILOs) represent the attributes of ideal EdUHK graduates and their expected qualities respectively. Learning outcomes work coherently at the University (GILOs), programme (Programme Intended Learning Outcomes) and course (Course Intended Learning Outcomes) levels to achieve the goal of nurturing students with important graduate attributes.

In gist, the Graduate Attributes for Undergraduate, Taught Postgraduate and Research Postgraduate students consist of the following three domains (i.e. in short "PEER & I"):

- **Professional Excellence;**
- **Ethical Responsibility; &**
- **Innovation.**

The descriptors under these three domains are different for the three groups of students in order to reflect the respective level of Graduate Attributes.

The seven GILOs are:

1. Problem Solving Skills
2. Critical Thinking Skills
3. Creative Thinking Skills
- 4a. Oral Communication Skills
- 4b. Written Communication Skills

5. Social Interaction Skills
6. Ethical Decision Making
7. Global Perspectives

1. Course Synopsis

Testing conditions can be so complicated that simple Rasch models or IRT models become inefficient or inapplicable. This course discusses advanced measurement issues and models, such as computerized adaptive testing, test linking, latent regression, many-faceted Rasch measurement, multidimensional models, bifactor and testlet models, higher-order models, and multilevel models. With the use of computer software *ConQuest* and *Mplus*, students will learn how to analyze the data in a professional way using advanced Rasch/ IRT measurement models.

2. Course Intended Learning Outcomes (CILOs)

Upon completion of this course, students will be able to:

- CILO₁ Understand the key concepts and issues involved in advanced Rasch/IRT models;
 CILO₂ Conduct appropriate advanced Rasch/IRT analysis in a professional manner, interpret results accurately to answer innovative research questions;
 CILO₃ Report statistical results in accordance with APA standards and conventions.

3. Content, CILOs and Teaching & Learning Activities

Course Content	CILOs	Suggested Teaching & Learning Activities
Computerized Adaptive Testing	CILO ₁	Self-directed learning
Test linking	CILO ₁₋₂	Lecture, student presentation, discussion
Many-faceted Rasch measurement	CILO ₁₋₂	Lecture, student presentation, discussion
Multidimensional Rasch models	CILO ₁₋₂	Lecture, student presentation, discussion
Bifactor and testlet model	CILO ₁₋₂	Lecture, student presentation, discussion
High-order models	CILO ₁₋₂	Lecture, discussion
Multilevel models	CILO ₁₋₂	Self-directed learning
Software workshops	CILO ₂	Hand-on workshops
Research project	CILO ₁₋₃	Data analysis and presentation

4. Assessment

Assessment Tasks	Weighting (%)	CILO
a. Mid-term exam	40%	CILO ₁₋₂

The in-class and open-book mid-term exam will cover the first half of the course contents. It will mainly consist of short-answer questions and essay questions.		
b. Oral presentation Each student will choose one paper/chapter from the reading material and orally present to the class.	10%	CILO ₁₋₂
c. Project report Each student will write a report (around 1500 words) to demonstrate how to apply advanced Rasch measurement models in education context.	50%	CILO ₁₋₃

5. Required Text(s)

Nil

6. Recommended Readings

- Adams, R. J., Wu, M. L., & Wilson, M. R. (2015). *ACER ConQuest: Generalised Item Response Modelling Software* [Computer software and Manual]. Version 4. Camberwell, Victoria: Australian Council for Educational Research.
- Cheng, Y.-Y., Wang, W.-C., & Ho, Y.-H. (2009). Multidimensional Rasch analysis of a psychological test with multiple subtests: A statistical solution for the bandwidth-fidelity dilemma. *Educational and Psychological Measurement*, *69*, 369-388.
- DeMars, C.E. (2006). Application of the bi-factor multidimensional item response theory model to Testlet-based tests. *Journal of Educational Measurement*, *43*(2), pp. 145-168.
- Eckes, T. (2005). Examining rater effects in TestDaF writing and speaking performance assessments: A many-facet Rasch analysis. *Language Assessment Quarterly*, *2*, 197-221.
- Fox, J.P. (2007). Multilevel IRT modeling in practice with the package mlirt. *Journal of Statistical Software*, *20*(5), 3-16.
- Fox, J.-P. (2010). *Bayesian item response modeling: Theory and applications*. New York: Springer.
- Huang, H.-Y., & Wang, W.-C. (2013). Higher order testlet response models for hierarchical latent traits and testlet-based items. *Educational and Psychological Measurement*, *73*, 491-511.
- Huang, H.-Y., Wang, W.-C., Chen, P.-H., & Su, C.-M. (2013). Higher-order item response models for hierarchical latent traits. *Applied Psychological Measurement*, *37*, 619-637.

- Hsu, C.-L., Zhao, Y., & Wang, W.-C. (2013). Exploiting computerized adaptive testing for self-directed learning. In M. M. C. Mok (Ed.). *Self-directed learning oriented assessment in the Asia Pacific* (pp. 257-280). Netherlands: Springer.
- Liu, O., Wilson, M., & Paek, I. (2008). A multidimensional Rasch analysis of gender difference in PISA mathematics. *Journal of Applied Measurement, 9*, 18-35.
- Michael. J. Kolen, M. J., & Brennan, R. L. (2004). *Test equating, scaling, and linking: Methods and practices* (2nd ed.), New York: Springer.
- Muthén, L.K. and Muthén, B.O. (1998-2017). *Mplus User's Guide* (8th ed). Los Angeles, CA: Muthén & Muthén.
- Reckase, M. (2009). *Multidimensional item response theory*. New York: Springer.
- Wainer, H., Bradlow, E. T., Wang, X. (2007). *Testlet response theory and its applications*. New York, NY: Cambridge University Press.
- Wainer, H., & Wang, X. (2000). Using a new statistical model for testlets to score TOFEL. *Journal of Educational Measurement, 37*, 203-220.
- Wang, W.-C. (2014). Multidimensional Rasch models: Theories and applications. In H.-H. Chang and Y. Chen (Eds.), *Advancing methodologies to support both summative and formative assessments* (pp. 217-243). Charlotte, NC: Information Age Publishing.
- Wang, W.-C., & Wilson, M. (2005). Rasch testlet model. *Applied Psychological Measurement, 29*, 126-149.
- Wang, X., Bradlow, E.T., & Wainer, H. (2002). A general Bayesian model for testlets: Theory and applications. *Applied Psychological Measurement, 26*, 109-128.
- Yu, C.-H., Sharon, E., & Popp, O. (2005). Test equating by common items and common subjects: Concepts and applications. *Practical Assessment Research & Evaluation, 10*(4). <http://pareonline.net/getvn.asp?v=10&n=4>

7. Related Web Resources

- <http://www.rasch.org>
- <http://www.rasch.org/software.htm>
- <http://www.winsteps.com/facets.htm>
- <https://shop.acer.edu.au/acer-shop/group/CON3>
- <http://www.statmodel.com/>
- <http://www.bristol.ac.uk/cmm/software/mlwin>
- <http://statisticalinnovations.com/products/latentgold.html>
- <http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml>

8. Related Journals

Applied Psychological Measurement

British Journal of Mathematical and Statistical Psychology

Educational and Psychological Measurement

Educational Measurement: Issues and Practice

Journal of Applied Measurement

Journal of Educational and Behavioral Statistics

Journal of Educational Measurement

Measurement: Interdisciplinary Research and Perspectives

Multivariate Behavioral Research

Psychometrika

9. Academic Honesty

The University adopts a zero tolerance policy to plagiarism. For the University's policy on plagiarism, please refer to the *Policy on Academic Honesty, Responsibility and Integrity with Specific Reference to the Avoidance of Plagiarism by Students* (<https://www.eduhk.hk/re/modules/downloads/visit.php?cid=9&lid=89>). Students should familiarize themselves with the Policy.

10. Others

Nil