Course list for Cross-Institutional Course Enrolment (Semester 2, 2023/24)

Faculty of Education
The University of Hong Kong

Last update: December 5, 2023

Course Code	Course Title	Level (RPG/TPG)	Pre-requisites	Class Dates	Class Time	Venue	Quota for Non-HKU Students (if any)	Course Syllabus URL	Contact Information (Name & Email)	Remarks (Please specify if the medium of instruction is NOT English)
EDUR7056	Regression (Part A)	RPG	1. EEDD6701 Research Methods I; or 2. EDUR6020 Quantitative Research Methods I & EDUR6021 Quantitative Research Methods II; or 3. A graduate course that covers inferential statistics is required.	Jan 23, 30; Feb 6 and 20, 2024 (Tuesdays)	18:30 - 21:30	MB249	Nil	Please refer to the attached course outline	Ms. Triffic Cheung trifficc@hku.hk	Nil
EDUR7057	Experimental Design (Part A)	RPG	1. EEDD6701 Research Methods I; or 2. EDUR6020 Quantitative Research Methods I & EDUR6021 Quantitative Research Methods II; or 3. A graduate course that covers inferential statistics is required.	Jan 24, 31; Feb 7 and 21, 2024 (Wednesdays)	18:30 - 21:30	CPD-4.17	Nil	(same as above)	(same as above)	Nil
EDUR7103	Structural Equation Modeling I	RPG	EDUR7109 Factor Analysis or equivalent	Jan 25; Feb 1, 8, and 22, 2024 (Thursdays)	18:30 - 21:30	CPD-LG.61	Nil	(same as above)	(same as above)	Nil
EDUR7104	Structural Equation Modeling II	RPG	EDUR7103 Structural Equation Modeling I or equivalent	Feb 29; Mar 14, 21 and 28, 2024 (Thursdays)	18:30 - 21:30	CPD-LG.61	Nil	(same as above)	(same as above)	Nil

EDUR7111	Meta-analysis	RPG	• Sound knowledge of linear regression analysis (demonstrated through evidence of passing a course that covered simple and multiple linear regression theory and applications) • Sound knowledge of ANOVA (demonstrated through evidence of passing a course that covered ANOVA theory and applications, including two-factorial ANOVA)	Jan 18, 25; Feb 1, 8 or 22, 2024 (Thursdays)	18:30 - 21:30	CPD-3.41	Nil	Please refer to the attached course outline	Ms. Triffic Cheung trifficc@hku.hk	The student(s) must meet the pre-requisite requirements
EDUR8044	Advanced Seminar in Educational Psychology	RPG	Nil	Jan 23, 30; Feb 6, 20, 27; Mar 12, 19 and 26, 2024 (Tuesdays)	18:30 - 21:30	MB100	Nil	(same as above)	(same as above)	The student(s) should contact the course instructor for approval. Approval will be granted (or otherwise) based on each individual's academic background.
EDUR8103	Transdisciplinary Research Design and Implementation Science	RPG	Nil	Jan 22; Feb 5, 26*; Mar 4*, 11, 18, 25*; and Apr 8*, 2024 (Mondays) *online	18:30 - 21:30	MB249	Nil	(same as above)	(same as above)	Nil
EDUR8303	Developing Scientific Thinking and Scientific Practice	RPG	Nil	Jan 25; Feb 1, 8, 22, 29; Mar 14, 21, 28; Apr 11, 18, 25; and May 2, 2024 (Thursdays)	18:30 - 20:30	MB249	Nil	(same as above)	(same as above)	The student(s) should submit application letter on why to enroll in this course

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR7056 Regression (Part A)

Introduction

This is a two-part course that focuses on techniques for analyzing non-experimental data, primarily multiple regression analysis. The course will introduce student to various models and procedures that can be used in regression analysis. In each meeting, the theoretical foundation of these procedures will be discussed; in addition to worked out examples, students will also have the opportunity to implement these procedures in SPSS when applicable.

Teacher(s)

Professor Jimmy DE LA TORRE

Course objectives

The objectives of the course are to help students 1) gain an understanding of how data are analyzed and interpreted in non-experimental research; 2) recognize the different situations under which the use of multiple regression analysis is appropriate; 3) learn various ways of formulating regression models, and 4) implement standard and nonstandard regression analyses in SPSS.

Course duration

12 hours

Course topics

For Part A of the course, below are the topics that will be covered in each meeting.

Meeting 1 will introduce the simple linear regression model (i.e., model with a single predictor). In addition to its assumptions, formulation and interpretation, its estimation and the inferences it supports will be discussed. The relationship between the simple linear regression model and the correlation coefficient will be examined.

Meeting 2 will focus on ascertaining the appropriateness of the fitted regression model. Different diagnostics will be examined to determine the extent to which the model assumptions can be considered appropriate. A number of remedial measures will be introduced to address different potential model violations.

Meeting 3 will introduce the simplest multiple regression model (i.e., model with two predictors). To understand how the model works in general, the matrix approach to linear regression model will be briefly discussed and illustrated. Similarities and differences between the simple and multiple regression models in terms of assumptions, interpretation, and estimation will be discussed.

Meeting 4 will give an in-depth discussion of the multiple regression model. Due to its more complex nature, different interpretations that can be derived from a multiple regression model will be emphasized. In addition, extensions of the model to cover nonlinear relationships will be discussed.

Course learning outcomes

1. To provide students with the knowledge that will allow them to recognize the use of appropriate models and procedures for regression analysis; and
2. To provide students with the skills that will allow them to implement a software package that performs multiple regression analysis.

Key readings

- Kutner, M., Nachtsheim, C., &, Neter, J. (2005). *Applied Linear Regression Models (4th ed.)*. New York: McGraw Hill.

Assessment methods

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
Students will have to complete four homework assignments for the materials covered in the four meetings. An assignment will be given after each meeting, and will be due the week after. The homework assignments will consist of problems pertaining to computation, computer implementation, and interpretation of results. Each homework assignment will be worth 25% of the final score. A final score of at least 80% is needed to pass the course.	Outcomes 1 and 2

Minimum attendance requirement

Students are expected to attend all lectures.

Course pre-requisite

1. EEDD6701 Research Methods I; or
2. EDUR6020 Quantitative Research Methods I & EDUR6021 Quantitative Research Methods II; or
3. A graduate course that covers inferential statistics is required.

(Version of June 30, 2023)

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THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR7057 Experimental Design (Part A)

Introduction

This is a two-part course that focuses on techniques for analyzing experimental data. The course will introduce student to various models and procedures that can be used in experimental design. In each of the four meetings, the theoretical foundation of these procedures will be discussed; in addition to worked out examples, students will also have the opportunity to implement these procedures in SPSS.

Teacher(s)

Professor Jimmy DE LA TORRE

Course objectives

The objectives of the course are to help students 1) gain the conceptual and statistical knowledge needed to properly design and analyze data from experiments; 2) understand the assumptions, requirements, and limitations of analysis of variance (ANOVA); 3) develop the language and concepts necessary for interpreting and reporting results from experiments; and 4) gain facility to implement ANOVA in SPSS.

Course duration

12 hours

Course topics

For Part A, below are the topics that will be covered in each meeting.

Meeting 1 will introduce the single-factor design (i.e., design with a single independent variable). Specifically, its assumptions, formulation, interpretation, as well as estimation and the inferences it supports will be discussed.

Meeting 2 will discuss specific hypotheses in the form of orthogonal contrasts to analyze data from a single-factor design. Analysis of trend for some type of dependent variables will also be covered in this meeting.

Meeting 3 will discuss the difference between planned and post hoc contrasts. Various procedures and their appropriate use will be presented. The meeting will also discuss power and effect size.

Meeting 4 will introduce the two-way factorial design (i.e., design with two independent variables). It will discuss the concept of and definition of an interaction, the statistical model and computation for two-way analysis, as well as blocking, effect size, sample size, and power.

Course learning outcomes

1. To provide students with the knowledge that will allow them to properly design experimental studies and analyze experimental data; and
2. To provide students with the skills that will allow them to implement a software package that performs ANOVA and related methods.

Key readings

- Keppel, G., & Wickens, T. D. (2004). Design and analysis: A researcher's Handbook (4th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Assessment methods

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
Students will have to complete four homework assignments for the materials covered in the four meetings. An assignment will be given after each meeting, and will be due the week after. The homework assignments will consist of problems pertaining to computation, computer implementation, and interpretation of results. Each homework assignment will be worth 25% of the final score. A final score of at least 80% is needed to pass the course.	Outcomes 1 and 2

Minimum attendance requirement

Students are expected to attend all lectures.

Course pre-requisite

1. EEDD6701 Research Methods I; or
2. EDUR6020 Quantitative Research Methods I & EDUR6021 Quantitative Research Methods II; or
3. A graduate course that covers inferential statistics is required.

(Version of June 30, 2023)

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR7103: Structural Equation Modeling I

Introduction

This course is part of a series designed to introduce students to the theory and practices of factor analysis (FA) and structural equation modeling (SEM). This series covers a range of multivariate statistical techniques used for analyzing structural or causal relationships, both direct and indirect, between observed and latent (unobserved) variables. The course sequence includes Factor Analysis, SEM I, and SEM II. The structure of each course in the series is consistent, with knowledge and experience building consecutively and cumulatively. The first two courses focus on fundamental principles and techniques, while the third course delves into state-of-the-art or emerging topics that are becoming increasingly prominent in the field. Although most in-class examples are drawn from education or psychology, the knowledge and skills taught in these courses are widely applicable across various disciplines in social and behavioral science. The courses emphasize not only theoretical and conceptual aspects, but also hands-on programming exercises, utilizing a learning-by-doing approach to engage students and enhance their understanding.

Teacher(s)

Dr Jinsong CHEN

Course objectives

Building on the foundation of Factor Analysis (or its equivalent), this course aims to provide a theoretical and analytical introduction to structural equation modeling (SEM). The course adopts a methodological approach to understanding SEM, rather than focusing solely on statistical aspects. The main objective is to introduce SEM as a methodological framework, addressing both research design and data analysis perspectives. From the design perspective, the course emphasizes general knowledge and conceptual theories that can inform and enhance research design. From the analysis perspective, the course focuses on specific skills and practical techniques, using real-data examples to illustrate their application. The course combines conceptual understanding, statistical analysis, and computational exercises, enabling students to develop a well-rounded understanding of SEM and its applications in various research contexts. By mastering these objectives, students will be equipped with the necessary knowledge and skills to effectively utilize SEM in their own research projects.

Course duration

12 hours

Course topics

The module consists of 4 sessions of 3-hour duration each. In each session, there will be a lecture followed by in-class activities and/or discussion.

Session 1. Path analysis: Research design
Session 2. Path analysis: Data analysis
Session 3. General Models: design and analysis
Session 4. Project presentation, special issues, and wrap up

Course learning outcomes

Upon successful completion of the course, students should be able to:

1. Understand the concepts, theory, and methodological foundations of SEM;
2. Understand the appropriate practice and applications of SEM when conducting empirical research;
3. Develop skills to conduct SEM with computer software and procedures of implementation; and
4. Develop skills in interpreting, communicating, and reporting results of the analysis.

Key readings

- Chen, J. (2023). Factor Analysis and Structural Equation Modeling in Methodology. Handouts.
- Chen, J. (2023). Factor Analysis and Structural Equation Modeling in Methodology: A Companion. Handouts.
- Kline, R. B. (2016). Principles and practice of structural equation modeling (4th ed.). New York: Guilford.
- Bollen, K. A. (1989). Structural equations with latent variables. New York, NY: Wiley.
- Kaplan, D. (2008). Structural equation modeling: Foundations and extensions (Vol. 10). SAGE publications.
- Raykov, T., & Marcoulides, G. A. (2012). A first course in structural equation modeling. Routledge.
- Bowen, N. K., & Guo, S. (2011). Structural equation modeling. Oxford University Press.
- Muthén, L.K. and Muthén, B.O. (1998-2017). *Mplus User's Guide. Eighth Edition*. Los Angeles, CA: Muthén & Muthén. https://www.statmodel.com/

Computer Software:

Statistical software R and Mplus will be used for computer exercise. Mplus can be accessed in RMS324. R (and its editor Rstudio) is free of charge. R can be downloaded from https://cran.r-project.org/; Rstudio can be downloaded from https://posit.co/download/rstudio-desktop/

Assessment methods

The course will be assessed on a Pass/Fail basis. There are three components of assessment for this course.

1. Class participation and in-class exercise (20%)
   - Reading, posing questions, exercising, group discussion, and sharing.
   - You are encouraged to post the above in the Discussion board of each session on Moodle.

2. Homework assignments (30%)
   - Throughout the course, students will have two homework assignments.
   - The homework assignments will consist of problems pertaining to conceptual understanding, design, analysis, computer implementation, and/or interpretation of results in SEM.

3. Final project: (50%)
    - Re-analysis of existing paper(s) with summary statistics (presentation + research report)
    - 1 ~ 3 students per group (depending on the class size)
    - Presentation: 10 – 20 minutes (including Q&A)
    - Report length: about 5 pages per person (in APA style)
    - Due date: TBC

Notes on final project

For the final project, each student should select at least one research paper that utilizes SEM or latent variable modeling (including factor analysis) and provides summary statistics, particularly the covariance structure of the data. Example papers will be provided. Follow these steps to complete the project:

1. Replicate at least some of the original analyses from the selected paper(s) and discuss any differences in findings, if applicable.

2. Propose alternative hypotheses and multiple models to compare with the original one(s). Briefly explain the rationale behind proposing these alternative hypotheses and models.

3. Re-analyze the data using the new models and compare the results with the original one(s).

4. Reflect on and discuss all the models and methods used throughout the project, considering their possible relationships to the topic. Analyze the implications of these findings and their relevance to the broader research area.

For students working on similar topics, collaboration is strongly encouraged to help develop a more comprehensive understanding of the topic area. By working together, you can form a larger picture of the research field and potentially identify new insights or opportunities for further exploration.

Please note that some projects may be encouraged and supported for revision and submission for publication.

Note: A final score of at least 75% is needed to pass the course.

Minimum attendance requirement

75%

Course pre-requisite

EDUR7109 Factor Analysis or equivalent

(Version of Dec 03, 2023)

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR7104: Structural Equation Modeling II

Introduction

This course is part of a series designed to introduce students to the theory and practices of factor analysis (FA) and structural equation modeling (SEM). This series covers a range of multivariate statistical techniques used for analyzing structural or causal relationships, both direct and indirect, between observed and latent (unobserved) variables. The course sequence includes Factor Analysis, SEM I, and SEM II. The structure of each course in the series is consistent, with knowledge and experience building consecutively and cumulatively. The first two courses focus on fundamental principles and techniques, while the third course delves into state-of-the-art or emerging topics that are becoming increasingly prominent in the field. Although most in-class examples are drawn from education or psychology, the knowledge and skills taught in these courses are widely applicable across various disciplines in social and behavioral science. The courses emphasize not only theoretical and conceptual aspects, but also hands-on programming exercises, utilizing a learning-by-doing approach to engage students and enhance their understanding.

Teacher(s)

Dr Jinsong CHEN

Course objectives

Building on the foundation of SEM I (or its equivalent), this course aims to provide a theoretical and analytical introduction to advanced topics in SEM. The course adopts a methodological approach to understanding advanced SEM, rather than focusing exclusively on statistical aspects. The primary objective is to present advanced SEM as a methodological framework that encompasses both research design and data analysis perspectives. Real-data examples will be used to illustrate the application of these advanced methods. The course integrates conceptual understanding, statistical analysis, and computational exercises, allowing students to develop a well-rounded understanding of advanced SEM and its applications across different research areas. By achieving these objectives, students will be equipped with the necessary knowledge and skills to effectively apply advanced SEM techniques in their own research projects.

Course duration

12 hours

Course topics

The module consists of 4 sessions of 3-hour duration each. In each session, there will be a lecture followed by in-class activities and/or discussion.

Session 1. Latent growth modeling and longitudinal data
Session 2. Measurement invariance and multigroup SEM
Session 3. Categorical and multilevel SEM
Session 4. Project presentation and structural causal modeling

Course learning outcomes

Upon successful completion of the course, students should be able to:

1. Understand the concepts and methodological foundations of advanced SEM;
2. Understand the appropriate practice and applications of advanced SEM when conducting empirical research;
3. Develop skills to conduct advanced SEM with computer software and procedures of implementation; and
4. Develop skills in interpreting, communicating, and reporting results of the analysis.

Key readings

- Chen, J. (2023). Factor Analysis and Structural Equation Modeling in Methodology. Handouts.
- Chen, J. (2023). Factor Analysis and Structural Equation Modeling in Methodology: A Companion. Handouts.
- Hancock, G. R., & Mueller, R. O. (Eds.). (2013). Structural equation modeling: A second course. Information Age Publishing.
- Bollen, K. A. (1989). Structural equations with latent variables. New York, NY: Wiley.
- Kaplan, D. (2008). Structural equation modeling: Foundations and extensions (Vol. 10). SAGE publications.
- Hoyle, R. H. (Ed.). (2012). Handbook of structural equation modeling. Guilford press.
- Muthén, L.K. and Muthén, B.O. (1998-2017). *Mplus User's Guide. Eighth Edition*. Los Angeles, CA: Muthén & Muthén. https://www.statmodel.com/

Computer Software:

Statistical software R and Mplus will be used for computer exercise. Mplus can be accessed in RMS324. R (and its editor Rstudio) is free of charge. R can be downloaded from https://cran.r-project.org/; Rstudio can be downloaded from https://posit.co/download/rstudio-desktop/

Assessment methods

The course will be assessed on a Pass/Fail basis. There are three components of assessment for this course.

1. Class participation and in-class exercise (20%)
   - Reading, posing questions, exercising, group discussion, and sharing.
   - You are encouraged to post the above in the Discussion board of each session on Moodle.

2. Homework assignments (30%)
   - Throughout the course, students will have two homework assignments.
   - The homework assignments will consist of problems pertaining to conceptual understanding, design, analysis, computer implementation, and/or interpretation of results in advanced SEM.

3. Final project: (50%)
   - Re-analysis of existing paper(s) with summary statistics (presentation + research report)
   - 1 ~ 3 students per group (depending on the class size)
   - Presentation: about 20 minutes (including Q&A)
   - Report length: about 10 ~ 20 pages (in APA style)
   - Due date: TBC

Notes on final project

For the final project, students are encouraged to collaborate on empirical research using any quantitative methods related to regression analysis, mediation, moderation, conditional process analysis, multilevel modeling, latent variable modeling (including Factor Analysis), and SEM in a broad sense. Data sources can come from your own data, existing datasets (e.g., TIMSS, PISA, PIRLS, or any other datasets of interest), or even summary statistics from existing papers (e.g., from SEM I). The presentation and report should cover the following aspects:

1. Research background, questions, design with methods, models, and assumptions.
   - Provide context and rationale for the research.
   - Clearly state the research questions and objectives or hypotheses.
   - Describe the design including the chosen methods, models, and their underlying assumptions.

2. Data analysis with interpretation of results.
   - Explain the process of data analysis.
   - Interpret and discuss the results in relation to the research questions.

3. Discussions of findings, limitations, and implications.
   - Reflect on the findings and their relevance to the research questions.
   - Acknowledge the limitations of the study and its implications.
   - Discuss the potential impact of the findings on the broader research area.

Please note that some projects may be encouraged and supported for revision and submission for publication.

Note: A final score of at least 75% is needed to pass the course.

Minimum attendance requirement

75%

Course pre-requisite

EDUR7103 Structural Equation Modeling I or equivalent

(Version of Dec 03, 2023)

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR7111 Meta-analysis

Introduction

Meta-analysis has become a popular tool to systematically aggregate different primary studies and summarize their results. In doing so, meta-analysis can improve the precision and accuracy of the estimates in the primary studies, as findings from individual studies may vary depending on sample, context, etc. Thereby, meta-analysis allows researchers to learn whether the effect of a variable is consistent across different studies on the same topic, or – if the results of different studies are inconsistent – what the reason for this inconsistency is. This course introduces meta-analytical techniques and the steps to conduct meta-analyses.

The course will be conducted over four meetings (each 3 hours). Students will learn theoretical knowledge of meta-analysis and acquire the skills to implement common meta-analysis models. Worked examples will be used and students will have the opportunity to implement meta-analysis in a software application (mostly using R and with additional examples for implementation using Comprehensive Meta-Analysis). Students will also discuss empirical articles and complete two homework assignments.

By the end of the course, students will: 1) have the conceptual and statistical knowledge needed to understand and examine different meta-analysis models; 2) understand the assumptions, requirements and limitations of meta-analysis; 3) be able to perform meta-analysis using a statistical software package; and 4) be able to interpret the statistical results.

Teacher(s)

Dr Frank REICHERT

Course objectives

This course introduces meta-analytical techniques and the steps to conduct meta-analyses. Meta-analysis allows researchers to learn whether the effect of a variable is consistent across different studies on the same topic, or – if the results of different studies are inconsistent – what the reason for this inconsistency is.

Course duration

12 hours

Course topics

<u>Meeting 1: Introduction to meta-analysis</u>
During the first meeting, students will learn what meta-analysis is and when it is used (and when it should not be used). Students will also learn about effect measures and how to convert study information into effect sizes, and how the precision of estimates can be affected. The question how to combine different studies leads the discussion of fixed-effect and random-effects models in Meeting 2.

Meeting 2: Fixed- and random-effects models

The fixed-effect model and the random-effects model will be introduced, and students will learn how to choose between these models for examining continuous, correlational and binary data. The concepts of heterogeneity, forest plots and prediction intervals will also be discussed in this second meeting.

Meeting 3: Subgroup analysis and meta-regression

Following up on heterogeneity that was introduced in Meeting 2, students will learn how to classify and explain heterogeneity and how to implement sub-group analysis. The meeting will also cover meta-regression and students will learn how to examine moderators in meta-analysis, when to look for moderators, and what common pitfalls they may encounter in meta-regression and how to address them.

Meeting 4: Further issues in meta-analysis

The final meeting covers a range of issues in meta-analysis and provides an outlook on advanced topics. We will discuss how to handle dependencies (incl. three-level meta-analysis), how to check for and what to do with outliers and influential cases, and how different forms of bias (e.g., publication bias, meta-bias) and missing data in meta-analysis can be addressed. The meeting will conclude by providing guidelines for reporting meta-analysis.

Course learning outcomes

Upon completion of this course, students should have the:

1. Ability to critically evaluate when it is appropriate to use meta-analysis and explain the benefits and limitations of meta-analysis;
2. Understanding of the conceptual and mathematical basis of meta-analysis models;
3. Capacity to plan a meta-analysis and to analyze different meta-analysis models in a software package; and
4. Skills in interpreting and communicating results of the meta-analyses.

Key readings

Mandatory readings

- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2021). *Introduction to meta-analysis* (2nd ed.). John Wiley & Sons. (only selected chapters)
- Borenstein, M., Higgins, J. P. T., Hedges, L. V., & Rothstein, H. R. (2017). Basics of meta-analysis: I^2 is not an absolute measure of heterogeneity. *Research Synthesis Methods*, *8*(1), 5–18. https://doi.org/10.1002/jrsm.1230
- IntHout, J., Ioannidis, J. P. A., Rovers, M. M., & Goeman, J. J. (2016). Plea for routinely presenting prediction intervals in meta-analysis. *BMJ Open*, *6*(7), e010247. https://doi.org/10.1136/bmjopen-2015-010247
- Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). How to do a systematic review: A best practice guide for conducting and reporting narrative reviews, meta-analyses, and meta-syntheses. *Annual Review of Psychology*, *70*, 747–770. https://doi.org/10.1146/annurev-psych-010418-102803

Optional/supplementary readings

- Beretvas, S. N. (2018). Meta-analysis. In G. R. Hancock, L. M. Stapleton, & R. O. Mueller (Eds.), *The reviewer's guide to quantitative methods in the social sciences* (2nd ed., pp. 260–268). Routledge.
- Borenstein, M. (2019). *Common mistakes in meta-analysis and how to avoid them*. Biostat, Inc. (only

selected chapters)

- Chen, D.-G., & Peace, K. E. (2021). *Applied meta-analysis with R and Stata* (2nd ed.). Chapman & Hall/CRC. (only selected chapters)
- Cooper, H. M., Hedges, L. V., & Valentine, J. C. (Eds.) (2019). *Handbook of research synthesis and meta-analysis* (3rd ed.). Russell Sage Foundation. (only selected chapters)
- Harrer, M., Cuijpers, P., Furukawa, T. A, & Ebert, D. D. (2022). Doing meta-analysis in R: A hands-on guide. Chapman & Hall/CRC. (only selected chapters)
- Hattie, J. (2023). *Visible learning: The sequel. A synthesis of over 2,100 meta-analyses relating to achievement*. Routledge. (only selected chapters)
- Hedges, L., & Maier, K. (2013). Meta-analysis. In M. A. Scott, J. S. Simonoff, & B. D. Marx (Eds.), *The SAGE handbook of multilevel modeling* (pp. 487–501). Sage.
- Schmid, C. H., Stijnen, T., & White, I. (Eds.) (2021). *Handbook of meta-analysis*. Chapman & Hall/CRC. (only selected chapters)
- Schwarzer, G., Carpenter, J. R., & Rücker, G. (2015). *Meta-analysis with R*. Springer. (only selected chapters)
- van den Noortgate, W., & Onghena, P. (2003). Multilevel meta-analysis: A comparison with traditional meta-analytical procedures. *Educational and Psychological Measurement*, *63*(5), 765–790. https://doi.org/10.1177/0013164402251027

Specific book chapters and additional weekly readings (for weekly forum posts) will be announced during the course.

Assessment methods

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
Two homework assignments (30% each) Students will have to complete two homework assignments for the materials covered in the four meetings. An assignment will be given after the second and another after the fourth meeting. Each assignment will be due before the next course meeting. The homework assignments will consist of problems pertaining to computation, computer implementation, and interpretation of results. Each homework assignment will be worth 30% of the final score.	Outcomes 1, 2, 3 and 4
Forum posts after each meeting (10% each) During the week after each meeting, students will have to read one theoretical article or a short empirical article reporting an application of the meta-analysis method or concept in the respective meeting and then submit short forum posts. Forum posts need to relate to methodological issues and can be, for instance, questions about the methods or analysis, methodological criticism and suggestions for improvement of the analysis, clarifications of the reported analysis, as well as responses to other students' questions (e.g., corrections or answers to questions on the analysis). Each week these posts will be worth 10% of the final score; at least two short posts are required each week and they will be assessed based on their quality and on the diversity over the entire semester (e.g., a student should not only post questions but also respond to questions).	Outcomes 1, 2 and 4

Note: A final score of at least 80% is needed to pass the course.

Minimum attendance requirement

100%

Course pre-requisite

- Sound knowledge of linear regression analysis (demonstrated through evidence of *passing* a course that covered simple and multiple linear regression theory and applications)
- Sound knowledge of ANOVA ((demonstrated through evidence of *passing* a course that covered ANOVA theory and applications, including two-factorial ANOVA)

(Version of June 30, 2023)

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR8044 Advanced Seminar in Educational Psychology

Introduction

Educational psychology is the science of applying psychological principles and theories to the creation of environments conducive to positive student learning and developmental outcomes. This course provides students with an opportunity to critically analyze a broad range of issues concerning both the learners/individuals (e.g., thinking, intelligence, personality, motivation, identity, emotion, and diverse needs) and the learning environment (e.g., teachers, teaching behaviors, curriculum, assessment, and educational intervention). This course also aims at acquainting students with the state-of the-art theories and research in educational psychology, stimulating students' innovative ways of advancing the field of educational psychology, as well as enriching their thinking about their own doctoral research topics. Emphasis is also given to the application of research findings in educational psychology to improving student learning and development within and beyond the classroom. Because educational psychology is a discipline that is at the interface between the art of education and the science of psychology, this course is one that should facilitate a productive intellectual dialogue among students from various academic disciplines, including cognitive psychology, developmental psychology, differential psychology, educational administration, early childhood education, higher education, learning and instruction, special education, educational and career guidance, and teacher education.

Teacher(s)

Prof. Li-fang ZHANG

Course objectives

This course is designed to provide theoretical support for the research of doctoral students studying in different academic disciplines. Specifically, it has five principal objectives:

1. To facilitate a holistic understanding of the state-of-the-art key theoretical constructs and empirical research in educational psychology and the implications of this body of literature for students, teachers/academics, student development educators, and school/university senior managers;

2. To acquaint students with different approaches to constructing congenial learning and teaching environments;

3. To enable students to critically analyze major theoretical perspectives and empirical research grounded in a particular theoretical construct they are interested in and to suggest possible ways to improve the literature under consideration;

4. To stimulate students' ideas about designing ways of applying empirical findings to educational practices from the standpoints of their respective fields of study; and

5. To guide students, where appropriate and feasible, to identify ways in which they could enrich their own doctoral research work and/or future academic work by taking into consideration what they will be learning from this course.

Course duration

24 hours

Course topics

1. **Course overview**: defining educational psychology and introducing *The Oxford Encyclopedia of Educational Psychology*
2. **Cognition** (e.g., cognitive regulation, conceptual change, critical thinking, intelligence, metacognition, problem-solving)
3. **Affect** (e.g., academic coping, creativity, defense mechanisms, emotions, mental toughness, motivation and engagement in learning, personality traits, psychological well-being)
4. **Teachers and teacher education** (e.g., learning to teach diverse learners; teachers, teacher preparation, and teaching practice; teacher self-efficacy; service learning and teacher education)
5. **Educational assessment and measurement** (e.g., assessment for learning and self regulation; assessment feedback skills in higher education; high-stake testing in K-12; high-stake assessment in undergraduate and post-graduate studies; dynamic cognitive assessment)
6. **Educational intervention** (e.g., cognitive early education; school crisis prevention and intervention; psychoeducation; school-based family counseling; school-based mindfulness interventions)
7. **Learning and instruction** (e.g., bilingualism and biliteracy; bilingualism effects on cognition in children; classroom discussion; gender and math development; peer tutoring and cooperative learning; students' misconceptions and science education; world languages education and the pedagogical imperative)
8. **Student development and diversity** (e.g., exceptional learners; at-risk students; inclusion of learners with special needs; gender differences in reading, writing, and language development; post-Piagetian perspectives of cognitive development; Vygotskian theory of development; literacy, basic processes, and interventions for struggling readers)

*** The topics listed in the above brackets are sample ones. Specific topics to be receiving in-depth examination will be contingent upon the choices of the students in the course as well as the instructor's selections based on the specific academic disciplines in which the students pursue their doctoral degrees.

Course learning outcomes

Upon completion of this course:

1. Students will gain a holistic understanding of the state-of-the-art key theoretical constructs and empirical research in educational psychology and the implications of this body of literature for students, teachers/academics, student development educators, and school/university senior managers;
2. Students will be exposed to and learn about different approaches to constructing congenial learning and teaching environments;
3. Students will critically analyze major theoretical perspectives and empirical research grounded in a particular theoretical construct that they are interested in and suggest possible ways to improve the literature under consideration;
4. Students will design ways of applying empirical findings to educational practices from the standpoints of their respective fields of study; and
5. Students will, where appropriate and feasible, identify ways in which they could enrich their own doctoral research work and/or future academic work by taking into consideration what they will be learning from this course.

Key readings

Primary reading

- Zhang, L. F. (Editor-in-chief, 2021). *The Oxford encyclopedia of educational psychology*. New York: Oxford University Press.

Supplementary reading

- Academic journal articles
- Duchesne, S., McMaugh, A., & Mackenzie, E. (2022). *Educational psychology for learning and teaching (7th ed.)*. South Melbourne, Victoria: Cengage Australia.
- Hoy, A. W. (2023). *Educational psychology (15th ed.)*. New York, NY: Pearson.
- Ormrod, J. E., Anderman, E. M., & Anderman, L. H.. (2020). *Educational psychology: Developing learners (10th ed.)*. Boston: Pearson.
- Slavin, R. (2020). *Educational psychology: Theory and practice (13th ed.)*. New York, NY: Pearson.

Assessment methods

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
Cooperative Learning (Group Presentation; 40%) Six group presentations will be conducted throughout the semester. Each group (comprising at least two members) will select one topic from any one of the seven themes listed under "course structure" (see earlier). Each group member will contribute to the presentation. Preparation of the presentation will begin with reading the particular article selected from the *Oxford Encyclopedia of Educational Psychology*, followed by reading relevant materials identified in other sources. The first group presentation will be conducted in the fourth session of the course (to allow students, especially the first group of presenters, enough time to prepare for their presentation). Each group presentation should be completed within 30 minutes, and it will be followed by a Q&A session of 20 minutes. Students will take turns to lead the Q&A sessions.	Outcomes 1, 2 and 4
Term paper (60%) (3,000 to 4,000 words) Critique an article selected from *The Oxford Encyclopedia of Educational Psychology* Students will be given the freedom to choose an article (from *The Oxford Encyclopedia of Educational Psychology)* to critique on. The main purpose of this individual project is to provide students with an opportunity to closely examine the topics that interest them the most. In	Outcomes 3, 4 and 5

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
the process of completing this project, students will be required not only to consult the literature documented in their selected articles but also to explore the key research work that is possibly missing in the articles and to identify new literature since the year 2018 when contributors to the Encyclopedia conducted their literature search. Each student will be critically evaluating the article that he/she selects in terms of the following: breath and depth of literature coverage, analysis of research methodology, the level of success of the article in having pointed out viable directions for advancing the theoretical perspectives and research on the topic concerned, a critical presentation of the missing literature and the new literature generated since 2018 and how this newly identified work can be integrated into the article critiqued, the practical implications of the findings for education in general, and the degree to which the literature under discussion could enrich one's own doctoral research work and/or future academic work.	

Minimum attendance requirement

To ensure the quality of teaching and learning, students must attend at least six of the eight class sessions – in person. (Please be informed that all sessions will be conducted in person only).

Course pre-requisite

Nil

(Version of June 30, 2023)

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR8103 Transdisciplinary Research Design and Implementation Science

Introduction

As the World is becoming more complex and increasingly multi-, inter- and beyond-disciplinary, solving complex problems, conducting research studies and handling grand challenges of our time, require approaches that transgress disciplinary practice and create new synergies. Transdisciplinarity is not just about building upon collective knowledge within disciplines and integrating these in solutions to problem-solving and research. Instead, it fundamentally leads to the design of new trans-methodological approaches and the generation of innovative solutions and knowledge that cannot be identified within any discipline alone.

This course explores transdisciplinarity, as currently theorised, within different academic communities and how that framework offers an insight into a new way of thinking about education, science, design and research. Another critical area of inquiry in this course focuses on how research outcomes can be taken to the '3rd space' to advance practice and impact the world beyond academia. The outcome is to create sustainable impact, educate the next generation of remarkable people to lead change and develop innovative researchers that help us adapt to our changing World. In this context, the course will explore integration and implementation sciences as a methodological approach for collaboration with communities and advancement of practice with societal impact.

Teacher(s)

Dr Daniel CHURCHILL

Course objectives

The course aims to expose students to the transdisciplinary theoretical and methodological concepts which would ultimately advance their theorising, research conceptualisation and impact potential and disposition. The course will achieve this by engaging students to discuss, explore and apply transdisciplinarity to complex problems and research that requires integration beyond core disciplines. Students will examine approaches by going beyond methodologies and concepts from their disciplines and their research plans, thus leveraging upon transdisciplinarity in reaching beyond academia with a profound impact on practice.

Course duration

24 hours

Course topics

1. Transdisciplinary-Interdisciplinarity-Multidisciplinary-Disciplinarity approaches
2. Zurich School v Nicolescuian Transdisciplinarity
3. Anti-disciplinary Design, Science, Research and Education
4. Transdisciplinary Approaches – STEM+, Digital Humanities, Social Justice Studies and Sustainability Education
5. Radical Constructivism, Activity Theory, 2nd and 3rd Order Cybernetics as Frameworks for creating 'transdisciplinary knowledge' through research.

6. Implementation and Integration Science

Course learning outcomes

Upon successful completion of the course, students should be able to:

1. Discuss the theoretical foundation of transdisciplinary education and research in the changing World;
2. Explore application of transdisciplinarity in a research design; and
3. Apply Implementation and Integration Science approaches to further impact of research outcomes.

Key readings

- Aneas, A. (2015). Transdisciplinary technology education: a characterisation and some ideas for implementation in the university. *Studies in Higher Education*, *40*(9), 1715-1728.
- Bammer, G. (2017). Should we discipline interdisciplinarity?. *Palgrave Communications*, *3*(1), 1-4.
- Bauer, M. S., & Kirchner, J. (2020). Implementation science: What is it and why should I care?. *Psychiatry research*, *283*, 112376.
- Bauer, M. S., Damschroder, L., Hagedorn, H., Smith, J., & Kilbourne, A. M. (2015). An introduction to implementation science for the non-specialist. *BMC psychology*, *3*(1), 1-12.
- Daneshpour, H., & Kwegyir-Afful, E. (2021). Analysing Transdisciplinary Education: A Scoping Review. *Science & Education*, 1-28.
- Heylighen, F., & Joslyn, C. (2001). Cybernetics and second-order cybernetics. *Encyclopedia of physical science & technology*, *4*, 155-170.
- Ito, J. (2016). Design and science. Journal of Design and Science. MIT Press.
- Klein, J. T. (2004). Prospects for transdisciplinarity. *Futures*, *36*(4), 515-526.
- Lepskiy, V. (2017). Evolution of cybernetics: philosophical and methodological analysis. *Kybernetes*.
- Nicolescu, B. (2014). Methodology of transdisciplinarity. *World Futures*, *70*(3-4), 186-199.
- Nicolescu, B. (2012). Transdisciplinarity: the hidden third, between the subject and the object. Human and Social Studies, (01), 13-28.
- Nicolescu, B. (2006). Transdisciplinarity: past, present and future. In Congresso Mundial de (pp. 1-24).
- McGregor, S. L. (2014). Introduction to special issue on transdisciplinarity. *World Futures,* 70(3-4), 161-163.
- McGregor, S. L. (2015). Transdisciplinary knowledge creation. In Transdisciplinary professional learning and practice (pp. 9-24). Springer, Cham.
- McGregor, S. L. (2004). The nature of transdisciplinary research and practice. *Kappa Omicron Nu human sciences working paper series*.
- McGregor, S. L. (2014). Transdisciplinarity and conceptual change. World Futures, 70(3-4), 200-232.
- McGregor, S. L., & Volckmann, R. (2013). Transversity: Transdisciplinarity in higher education. *Leading transformative higher education*, 58-81.
- Mittelstrass, J. (2011). On transdisciplinarity. *Trames*, *15*(4), 329-338.
- Petrie, H. G. (1992). Chapter 7: Interdisciplinary Education: Are We Faced With Insurmountable Opportunities?. *Review of research in education*, *18*(1), 299-333.
- Rigolot, C. (2020). Transdisciplinarity as a discipline and a way of being: complementarities and creative tensions. *Humanities and Social Sciences Communications*, *7*(1), 1-5.

- Rigolot, C. (2021). Organising and better understanding transdisciplinarity in the context of artificial intelligence expansion: a crucial role for the new alliance between economics and engineering. *Journal of Industrial and Business Economics*, *48*(4), 615-620.
- Schilling, H. K. (1966). The Unity of Knowledge. *The Journal of General Education*, 251-258.
- Scholz, R. W. (2020). Transdisciplinarity: science for and with society in light of the university's roles and functions. *Sustainability science*, *15*(4), 1033-1049.

Assessment methods

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
Presentation and written proposal (60%) Participants will critically analyse their projects through the lens of transdisciplinarity and deliver a presentation and 3,000 words written proposals outlining any plans for improvements in research designs.	Outcomes 1 and 2
Presentation and written plan (40%) Participants will examine their research designs and outline implementation of their project outcomes beyond academia and with a clear impact on practice in their respective professional fields/disciplines (a presentation and 2,000-words written plan).	Outcomes 1 and 3

Minimum attendance requirement

6 out of 8 sessions

Course pre-requisite

Nil

(Version of June 30, 2023)

Tentative and subject to change

THE UNIVERSITY OF HONG KONG
Faculty of Education
Academic Year 2023-24

EDUR8303 Developing Scientific Thinking and Scientific Practice

Introduction

This course aims to provide participants with the foundational knowledge of scientific thinking and practice relevant to science for all and to support students working as researchers. With the knowledge explosion, AI revolution, and post-pandemic challenges, there are now pervasive educational needs for students to develop the capacities of inquiry, problem solving, scientific thinking, and creative knowledge work. Students from science and non-science streams, ranging from K-12 to tertiary classrooms, and graduate students all need to develop scientific thinking in face of post-truth uncertain information (e.g., social media) and to engage in the generation of new ideas for advancing society's intellectual capital. Developing students as researchers and scientists is increasingly advocated in university and K-12 education. With the advent of technology and big data, there are many new demands but rich opportunities for developing students' scientific thinking and practice, supporting them in becoming better learners. This course argues that scientific thinking is more than a body of knowledge but how people think scientifically, which is needed for educated citizens in the contemporary world. The course draws from three intersecting research areas–the science of science, science education, and learning sciences to provide participants with theories, principles, and practice on developing scientific thinking and practice and supporting students to become scientists, researchers, and better learners.

Teacher(s)

Professor Carol CHAN, Dr Chenwei ZHANG and Dr Logan CHEN

Course objectives

The course is premised on theories and research of scientific thinking and scientific practice, and participants will be introduced to both scientific and educational perspectives. The first section begins with foundational issues about what is science, what are the mechanisms underlying the doing of science, and what is science communication. Another foundational issue is what is scientific skills and how students learn science drawing on learning theories and how science learning sheds light on how people learn. The following section considers students' understanding of the nature of science and epistemology (knowing and knowledge) critical for their thinking and learning, and how students' scientific views and understanding can be assessed. The third section discusses approaches and designs for developing scientific thinking and practice, including science for everyday learning. Different perspectives including classroom pedagogy, various technologies, and data-driven approaches will be included. Participants will read the research literature on scientific thinking and scientific practice and be familiarized with research methods and approaches for investigating different problems. They will also work on a group presentation demonstrating their understanding of a specific approach to developing students' scientific thinking and practice to help them become better learners in different contexts/scenarios.

Specifically, the course objectives include:

- To identify key theories, perspectives, and principles underpinning the nature of science, science communication, scientific thinking, and scientific practice;
- To examine students' science development including science understanding, scientific thinking and scientific epistemology;

- To examine different pedagogical approaches, strategies and learning environments for promoting students' scientific thinking and research practice; and
- To apply the knowledge and to design relevant applications to promote students working as scientists and researchers in different educational contexts.

Course duration

24 hours

Course topics

Foundational Issues

1. What is Science? How do Scientists Work? What is Science Communication? (Dr Chenwei Zhang)
2. What is Scientific Thinking? How do Students Learn Science? (Prof. Carol Chan)

Assessing Students' Understanding of Science

3. Nature of science and personal epistemology (Prof. Carol Chan)
4. Assessing Science Understanding (Dr Logan Chen)
5. Misconception, Conceptual Change, and Assessment (Dr Logan Chen)

Supporting Students' Scientific Thinking and Practice for Learning

6. STEM Education, Technology and Simulation (Dr Logan Chen)
7. Science Interest and Identity (Dr Logan Chen)
8. Knowledge Building and Students as Scientists (Prof. Carol Chan)
9. Interdisciplinary Thinking & Scientific Practice (Dr Chenwei Zhang)
10. Data Science Thinking (Dr Chenwei Zhang)
11. Science in Everyday Life (Dr Logan Chen)
12. Summary and Presentation (Dr Chenwei Zhang, Dr Logan Chen, Prof. Carol Chan)

Course learning outcomes

At the end of the course, students should have achieved the following outcomes:

1. Demonstrate the understanding of key theories, perspectives, and principles underpinning the nature of science, science communication, scientific thinking, and scientific practice;
2. Identify methods and techniques to assess and analyze students' science understanding, scientific thinking and scientific epistemology;
3. Identify and evaluate different pedagogical approaches and strategies for promoting students' scientific thinking and scientific research practice; and
4. Apply the knowledge and design of relevant applications from literature to promote students working as scientists/researchers in different educational contexts; and justify the application in relation to different learning needs or problems.

Key readings

- Aikenhead, G. S. (2006). *Science education for everyday life: Evidence-based practice*. Teachers College Press.
- Bubela, T., Nisbet, M. C., Borchelt, R., Brunger, F., Critchley, C., Einsiedel, E., ... & Caulfield, T. (2009). Science communication reconsidered. *Nature Biotechnology*, *27*(6), 514-518.

- Burns, T. W., O'Connor, D. J., & Stocklmayer, S. M. (2003). Science communication: a contemporary definition. *Public Understanding of Science*, *12*(2), 183-202.
- Chan, C.K.K., & van Aalst J. (2018). Knowledge building: Theory, design and analysis. In F. Fischer, C. Hmelo-Silver, S. Goldman & P. Reimann (Eds.). *The international handbook of the learning sciences* (pp.295-307). New York: Routledge.
- Elby, A., Macrander, C., & Hammer, D. (2016). Epistemic cognition in science. In J.A.Greene, W.A. Sandoval, & I. Braten (eds.), Handbook of epistemic cognition (pp.113-127). New York: Routledge.
- Fortunato, S., Bergstrom, C. T., Börner, K., Evans, J. A., Helbing, D., Milojević, S., ... & Barabási, A. L. (2018). Science of science. *Science*, *359*(6379), eaao0185.
- Jacobs, J. A., & Frickel, S. (2009). Interdisciplinarity: A critical assessment. *Annual Review of Sociology*, *35*, 43-65.
- Klahr, D., Zimmerman, C., & Jirout, J. (2011). Educational interventions to advance children's scientific thinking. *Science*, *333* (6045), 971-975.
- Kuhn, D. (2010). What is scientific thinking and how does it develop? In U. Goswami (Ed.), T*he Wiley-Blackwell handbook of childhood cognitive development*, 497-523. Wiley-Blackwell.
- Sinatra, G. M., & Hofer, B. K. (2021). *Science denial: Why it happens and what to do about it*. Oxford University Press.
- Yang, F. Y., & Tsai, C. C. (2012). Personal epistemology and science learning: A review on empirical studies. *Second international handbook of science education*, 259-280.

Assessment methods

Assessment (weighting of each assessment)	Learning outcome(s) to be assessed
Reflection/ Forum Discussion (25%) Reflection, activities and forum discussion on the different topics	Outcomes 1, 2, 3 and 4
Student Group Presentation (25%) Presentation of a specific approach for assessing/promoting students' scientific thinking and practice and inquiry in science or other educational contexts	Outcome 4
Literature Review (50%) A critical review of the literature on a specific topic on assessing and developing scientific thinking and scientific practice	Outcomes 1, 2, 3 and 4

Minimum attendance requirement

Students should attend at least 9 sessions, in addition to the completion of online discussions and participation in a group presentation at the end of the course.

Course pre-requisite

Nil

(Version of June 30, 2023)