

## **COURSE CONTENT**

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| <b>Course Coordinator</b> | Wang Wenjie  |
| <b>Course Code</b>        | HE4203   |
| <b>Course Title</b>       | Microeconometrics & Panel Data                           |
| <b>Pre-requisites</b>     | HE3003 Econometrics II                                   |
| <b>No of AUs</b>          | 4  |
| <b>Contact Hours</b>      | 52 hours (2 hours lecture and 2 hours tutorial per week) |

### **Course Aims**

This course is intended to be a practical guide for students doing applied economic research. Topics covered include causal inference, average treatment effect, randomized experiment, regression adjustment, instrumental variables regressions, panel data, first difference and individual/time fixed effects model, two-way fixed effects model, difference-in-differences, and regression discontinuity design. Students will get hands-on experience with data analysis and causal inference by using statistical packages such as STATA or R. All the econometric methods introduced in the course will be illustrated by extensive empirical examples with real-world data. Practical advice on how to design an empirical research project and how to write an applied economics paper will also be provided.

### **Intended Learning Outcomes (ILO)**

By the end of this course, you (as a student) would be able to:

1. Use econometric models as a guideline to design various empirical studies.
2. Interpret and discuss the state of art research methods in applied microeconomics.
3. Fluently use statistical packages to conduct econometric analysis especially those using instrumental variables, panel data, and difference-in-differences.
4. Conduct basic applied microeconomic analyses especially policy analyses and program evaluations.

### **Course Content**

The main econometric topics covered are: Causal inference, Estimation of average treatment effect, Randomized experiments, Quasi-experiments, Instrumental variables, Panel data Models (first difference, individual/time fixed effects, two-way fixed effects), Difference-in-differences, Causal inference with noncompliance, and Regression discontinuity.

The main empirical applications covered are: Effect of institutional quality on economic growth, Effect of years-of-education on wage, Effect of Chinese import on US labor market, Effect of family size on mother's employment, Why do protestants tend to have higher economic prosperity, Analysis of demand, supply, and market equilibrium, Estimating return-to-education using identical twins, Effect of alcohol taxes on traffic deaths, Effect of childcare availability on mother's employment, Intrinsic vs extrinsic motivations in behavioral economics, Effect of minimum wage on the employment in fast food restaurants, Nobel prize in economics for causal analysis, Lottery draft during the Vietnam war, Causal inference with judge design, Quarter of birth as an Instrumental

Variable, Merit-based scholarship programs, Effect of mayor election on education, The elite illusion, etc.

**Assessment**

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|----------------------|-------------|
| Class Participation: | 20%         |
| Group Project:       | 20%         |
| Presentation:        | 20%         |
| Quiz 1:              | 20%         |
| Quiz 2:              | 20%         |
|                      | -----       |
| <b>Total</b>         | <b>100%</b> |
|                      | -----       |

**Reading and References**

Main References: Lecture notes

Supplementary References:

[SW] Stock, J.H., Watson, M.W. Introduction to Econometrics, 3rd or 4th Ed.

[AP] Angrist, J.D., Pischke, J.S. Mastering Metrics, 1st Ed.

**Course Instructors**

| Instructor  | Office Location | Email              |
|-------------|-----------------|--------------------|
| Wang Wenjie | -               | wang.wj@ntu.edu.sg |

**Planned Weekly Schedule**

| Week   | Topic   | Course LO | Readings/ Activities  |
|--------|---|-----------|---|
| Week 1 | Introduction and Overview   | 1-4       | Main reference: Lecture notes   |
| Week 2 | Causal analysis, Average treatment effect, Randomized experiment, Field experiment in development economics                                       | 1-4       | Main reference: Lecture notes<br>Supplementary reference: SW 13.1, 13.3   |
| Week 3 | Regression fundamentals, Regression and causality, Endogeneity issue, Effect of institutional quality on economic growth                          | 1-4       | Main reference: Lecture notes<br>Supplementary reference: SW Chapters 6-8 |
| Week 4 | Instrumental variables: IV estimation, Two-stage least squares, Effect of years-of-education on wage, Effect of Chinese import on US labor market | 1-4       | Main reference: Lecture notes<br>Supplementary reference: SW 12.1, 12.2   |

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| Week 5             | Instrumental Variables: Weak instruments, Test of overidentification, Hausman test, Effect of family size on mother's employment   | 1-4 | Main reference: Lecture notes<br>Supplementary reference: SW 12.3, 12.4       |
| Week 6             | Instrumental Variables: Simultaneous equation model, Why do protestants tend to have higher economic prosperity, Econometric analysis of demand, supply, and market equilibrium  | 1-4 | Main reference: Lecture notes<br>Supplementary reference: SW 12.4, 12.5       |
| Week 7             | Panel Data: First difference, Individual/Time Fixed effects, Estimating return-to-education using identical twins, Effect of alcohol taxes on traffic deaths   | 1-4 | Main reference: Lecture notes<br>Supplementary reference: SW 10.1, 10.2, 10.3 |
| <b>Recess Week</b> |  |     |   |
| Week 8             | Panel Data: Two-way fixed effects model, Difference-in-differences, Effect of childcare availability on mother's employment, Intrinsic vs extrinsic motivations in behavioral economics, Effect of minimum wage on the employment in fast food restaurants | 1-4 | Main reference: Lecture notes<br>Supplementary reference: SW 10.3, 10.4, 10.6 |
| Week 9             | Noncompliance: Nobel prize in economics for causal analysis, Intention-to-treat, Local average treatment effect, Wald estimator  | 1-4 | Main reference: Lecture notes<br>Supplementary reference: AP Chapter 3        |
| Week 10            | Noncompliance: Randomized experiment with two-sided noncompliance, The monotonicity assumption, Lottery draft during the Vietnam war, Causal inference with judge design, Quarter of birth as an instrumental variable                                     | 1-4 | Main reference: Lecture notes<br>Supplementary reference: AP Chapter 3        |
| Week 11            | Regression discontinuity: As-if randomization at the cutoff, Merit-based scholarship programs, Effect of mayor election on education in Turkey   | 1-4 | Main reference: Lecture notes<br>Supplementary reference: AP Chapter 4        |
| Week 12            | Regression discontinuity: Fuzzy regression discontinuity, Extension to multiple cutoffs and scores, Geographic regression discontinuity, The elite illusion  | 1-4 | Main reference: Lecture notes<br>Supplementary reference: AP Chapter 4        |
| Week 13            | Review   | 1-4 | Main reference: Lecture   |

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