# SYLLABUS

# COURSE

# Econometrics II

# (EKO1302)



**Lecturer Team:**

1. Dr. Tony Irawan
2. Prof. Muhammad Firdaus
3. Dr. Iman Sugema
4. Dr. Heni Hasanah
5. Fahmi Salam Ahmad, M.Si
6. Dian Verawati Panjaitan, M.Si

**DEVELOPMENT ECONOMICS STUDY PROGRAM
DEPARTMENT OF ECONOMICS
FACULTY OF ECONOMICS AND MANAGEMENT
IPB UNIVERSITY
2024**

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## SEMESTER LESSON PLANS (RPS)

| Course Name (MK) | Course Code | Course Cluster | Weight (credits) | | Semester | Approval Date |
|---|---|---|---|---|---|---|
| Econometrics II | EKO1302 | Foundational Literasies, Academic Core Courses | Lecture: 2 | Practicum: 1 | 4 | August 12, 2024 |
| | **Total student workload:** | | **Face-to-face:** | **Independent learning:** | **Maximum class size:** | |
| | 135 Hours | | 60 Hours | 75 Hours | 100 Students | |

| AUTHORIZATION / APPROVAL | **RPS Developer Lecturer** | **Course Coordinator** | **Head of Study Program** |
|---|---|---|---|
| | Signature | Signature | Signature |
| | Dr. Tony Irawan | Dr. Tony Irawan | Dr. Tony Irawan |

| **Course Category** | ~~CCC~~/~~FC~~/FL/ACC/~~IC~~/~~Final Year Project~~ |
|---|---|
| **Course Description** | This course provides students with knowledge of advanced econometric concepts and expertise in estimating econometric models for time series and panel data. These concepts include stationarity, cointegration, causality, and volatility. The advanced models referred to include the Error Correction Model (ECM), Vector Autoregression (VAR), Vector Error Correction Model (VECM), and ARCH/GARCH models. For panel data, models such as Fixed-Effects, Random-Effects, the Hausman test, and an introduction to dynamic panel data models (DPD) will be introduced. This course will also emphasize the application of various data processing software for economic studies, such as RStudio, EViews, and Stata. |

| Intended Learning Outcomes (ILOs) of the Study Program | **Study Program Learning Outcomes assigned to the Course** | |
|---|---|---|
| | **ILO 1** | Possessing skills in applying analytical methods, concepts, and economic theories according to the development of science and technology for decision-making, problem-solving, and planning, both on a micro and macro scale for development, social, and business interests. |
| | **ILO 2** | Mastering the concepts, theories, and analytical methods in the field of economics both micro and macro, as well as their branches. |
| | **ILO 3** | Able to communicate verbally and in writing in the field of economics logically, creatively, and innovatively by utilizing the development of science and technology, interact with the community, and make decisions responsibly both independently and in groups. |

| Course Learning Outcomes | **Learning Outcomes (CLOs)** | |
|---|---|---|
| | **CLO 1** | Students are able to use time series and panel econometric models that are appropriate for the characteristics of the data used. |
| | **CLO 2** | Students have the ability to estimate econometric models using various available software. |
| | **Sub-Learning Outcomes (Sub-CLOs)** | |
| | **Sub-CLO 1** | Students are able to explain the basic concepts of econometrics for time series data and the concept of stationarity accurately |

| | | |
|---|---|---|
| | **Sub-CLO 2** | Students are able to conduct univariate time series model analysis accurately using software |
| | **Sub-CLO 3** | Students are able to conduct multivariate time series model analysis accurately using software |
| | **Sub-CLO 4** | Students are able to conduct heteroskedasticity modeling analysis on time series data accurately using software |
| | **Sub-CLO 5** | Students are able to explain the concepts and basic forms of panel data |
| | **Sub-CLO 6** | Students are able to conduct analyses that accommodate individual heterogeneity in static panel data accurately using software |
| | **Sub-CLO 7** | Students are able to conduct dynamic panel data analysis accurately using software |

| **Relevance of CLO and Sub-CLO**<br><br>*Tick ( ✓) according to relevance* | | **CLO 1** | **CLO 2** |
|---|---|---|---|
| | **Sub-CLO 1** | V | V |
| | **Sub-CLO 2** | V | V |
| | **Sub-CLO 3** | V | V |
| | **Sub-CLO 4** | V | V |
| | **Sub-CLO 5** | V | V |
| | **Sub-CLO 6** | V | V |
| | **Sub-CLO 7** | V | V |

| **Courses offered for** | ✔ Major |
|---|---|
| **Main References** | 1. Wooldridge, J. M. 2002. Econometric Analysis of Cross Section and Panel Data<br>2. Enders, W. 2003. Applied Econometric Time Series. John Wiley and Sons<br>3. Baltagi, B. H. 2005. Econometric Analysis of Panel Data. Third Edition. John Wiley and Sons<br>4. Firdaus, M. 2018 (2020 Edition). *Aplikasi Ekonometrika untuk Data Panel dan Time Series*. IPB Press. |
| **Lecturers (Teaching Team)** | 1. Dr. Tony Irawan<br>2. Prof. Muhammad Firdaus<br>3. Dr. Iman Sugema<br>4. Dr. Heni Hasanah<br>5. Fahmi Salam Ahmad, M.Si<br>6. Dian Verawati Panjaitan, M.Si |

Table 1. Lesson Plan for Each Meeting

| Week | Basic Competence/ Final Skills (Sub-CLO) | Study Material | Learning Method | Estimated Time (Minutes) | Learning Experience | Indicator | Assessment Criteria | Assessment Weight (%) |
|---|---|---|---|---|---|---|---|---|
| Students are able to: | | | | | | | | |
| 1 | Students are able to explain the basic concepts of econometrics for time series data and the concept of stationarity accurately | • Review of basic econometrics as a foundation for understanding time series models | • Lecture<br>• Q&A<br>• Assignment<br>• Group discussion<br>• Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning the basic concepts of econometrics for time series data | The accuracy and completeness of students in explaining the basic concepts of econometrics for time series data | • Project Results<br>• Cognitive / Knowledge: Midterm Exam | |
| 2 | Students are able to explain the basic concepts of econometrics for time series data and the concept of stationarity accurately | • Concept of stationarity<br>• Autoregressive model and its variations<br>• Dickey-Fuller stationarity test | • Lecture<br>• Q&A<br>• Assignment<br>• Group discussion<br>• Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning the concept of stationarity dalam data time series and applying the stationarity test using the Dickey-Fuller test in various autoregressive model variations | The accuracy and completeness of students in implementing the stationarity test using the Dickey-Fuller test in various autoregressive model variations | • Project Results<br>• Cognitive / Knowledge: Midterm Exam | 4 |
| 3 | Students are able to conduct univariate time series model analysis accurately using software | • Stationarity test<br>• Autoregressive (AR) process<br>• Moving average (MA) process<br>• Integrated process<br>• ARIMA | • Lecture<br>• Q&A<br>• Assignment<br>• Group discussion<br>• Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning the univariate time series analysis method, namely ARIMA, including its concepts and practical analysis | The skills and accuracy of students in conducting the univariate time series modelling, namely ARIMA, and applying it with software for forecasting | • Project Results<br>• Cognitive / Knowledge: Midterm Exam | 4 |
| 4 | Students are able to conduct multivariate time series model analysis accurately using software | • Regression model without dynamics<br>• Finite distributed lag model<br>• Multiplier analysis and interpretation | • Lecture<br>• Q&A<br>• Assignment<br>• Group discussion<br>• Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning linear regression models in multivariate time series analysis and applying them with software | The skills and accuracy of students in conducting multivariate time series modeling using linear regression and interpreting it as well as practicing it with software | • Project Results<br>• Cognitive / Knowledge: Midterm Exam | 4 |
| 5 | Students are able to conduct multivariate time series model analysis accurately using software | • Autoregressive distributed lag (ARDL) model<br>• Error correction model (ECM)<br>• Multiplier analysis and interpretation | • Lecture<br>• Q&A<br>• Assignment<br>• Group discussion<br>• Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning the use of autoregressive distributed lag model and applying it with software | The skills and accuracy of students in conducting multivariate time series modeling using the ARDL model and interpreting it as well as practicing it with software | • Project Results<br>• Cognitive / Knowledge: Midterm Exam | 5 |
| 6 | Students are able to conduct multivariate time series model analysis accurately using software | • Vector autoregressive (VAR)<br>• Vector error correction model (VECM) | • Lecture<br>• Q&A<br>• Assignment<br>• Group discussion | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning VAR or VECM models and applying them with software | The skills and accuracy of students in conducting multivariate time series modeling using VAR/VECM models and interpreting it as well as practicing it with software | • Project Results<br>• Cognitive / Knowledge: Midterm Exam | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | ● Impulse response function | ● Studying practical analysis videos with software | | | | | |
| 7 | Students are able to conduct heteroskedasticity modeling analysis on time series data accurately using software | ● Modelling heteroskedasticity<br>● Autoregressive conditional heteroskedasticity (ARCH)<br>● Generalized ARCH (GARCH)<br>● Threshold GARCH<br>● GARCH in Mean | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 2x60" | Learning forms of heteroskedasticity modeling in time series data and applying it with software | The skills and accuracy of students in conducting heteroskedasticity modeling in time series data and interpreting it as well as practicing it with software | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | 4 |
| 8 | Exams to evaluate material mastery by students on the material of Meeting 1 up to Meeting 7 | Material from Meeting 1 to Meeting 7 | Completing written exam questions | **2x60"** | Understanding the material taught, both in theory and in its practical application in the real world. | ● Completeness and accuracy of explanations in answering exam questions | ● Paper-based written exam to assess understanding of the material | 24 |
| 9 | Students are able to explain the concepts and basic forms of panel data | ● Review of basic econometrics as a foundation for understanding time series models | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning basic econometrics concepts for panel data | The skills and accuracy of students in explaining the basic econometrics concepts for panel data | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | |
| 10 | Students are able to explain the concepts and basic forms of panel data | ● Advantages of panel data<br>● Limitations of panel data<br>● Presentation of panel data | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning the advantages, limitations, and presentation methods of panel data that are ready to be processed with software | The skills and accuracy of students in explaining the advantages, limitations, and presentation methods of panel data | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | |
| 11 | Students are able to explain the concepts and basic forms of panel data | ● Pooled cross section<br>● Two-period panel data | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning the concept of panel data from the simplest forms, namely pooled cross-section and two-period panel data | The skills and accuracy of students in explaining the concept of panel data from the simplest forms | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | 5 |
| 12 | Students are able to conduct analyses that accommodate individual heterogeneity in static panel data accurately using software | ● Individual heterogeneity<br>● One-way error components model<br>● First differencing of | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning the role of individual heterogeneity in panel data and techniques to accommodate it | Learning the role of individual heterogeneity in panel data and techniques to accommodate it | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | 5 |

| No | Learning Outcome | Study Material | Learning Method | Duration | Learning Experience | Assessment Indicator | Assessment Form | Weight |
|---|---|---|---|---|---|---|---|---|
| | | two-period panel data | ● Studying practical analysis videos with software | | | | | |
| 13 | Students are able to conduct analyses that accommodate individual heterogeneity in static panel data accurately using software | ● Within estimator<br>● Least squares dummy variables (LSDV) | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning panel data models that accommodate individual heterogeneity, namely the fixed effects model with within approach and LSDV, as well as applying it with software | The skills and accuracy of students in explaining and applying fixed effects model modeling in panel data, both with the within approach and LSDV | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | 6 |
| 14 | Students are able to conduct analyses that accommodate individual heterogeneity in static panel data accurately using software | ● Random effects model<br>● Hausman test<br>● Two-way error components model | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning the random effects model for pane; data modeling and applying tests to choose the better panel data model | The skills and accuracy of students in explaining and applying random effects model for panel data modelling, as well as applying tests to choose the better panel data model | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | 6 |
| 15 | Students are able to conduct dynamic panel data analysis accurately using software | ● Instrumental variables (IV)<br>● First difference Generalized Method of Moments (FD-GMM)<br>● System Generalized Method of Moments (Sys-GMM) | ● Lecture<br>● Q&A<br>● Assignment<br>● Group discussion<br>● Studying practical analysis videos with software | **Lecture Duration:** 2x50"<br>**Practicum**: 3x50" | Learning panel data methods that accommodate the lag effects of dependent variables and applying them using software. | The skills and accuracy of students in explaining and applying dynamic panel data modeling | ● Project Results<br>● Cognitive / Knowledge: Midterm Exam | 4 |
| 16 | Students are capable of completing written exam questions to evaluate their mastery of the material from Meeting 9 through Meeting 15 | Material from Meeting 9 to Meeting 15 | Completing written exam questions | **2x60"** | Understanding the material taught, both in theory and in its practical application in the real world. | ● Completeness and accuracy of explanations in answering exam questions | ● Paper-based written exam to assess understanding of the material | 25 |

Table 2. Assessment Components

| No | Assessment Component | Score Range | Weight (%) | Description |
|---|---|---|---|---|
| 1. | Participatory Activities | | | |
| 2. | Project Results | | 51 | Students work in groups and individually to complete problem-solving assignments using an econometric model approach in the context of time series data during the midterm exam (UTS) and in the context of panel data during the final exam (UAS) |

| 3. | Cognitive/Knowledge | | | |
|---|---|---|---|---|
| | ● Assignment | | | |
| | ● Quiz | | | |
| | ● Midterm Exam | | 24 | Exam to assess students' mastery of the material for Sub-CLO 1 to Sub-CLO 4 |
| | ● Final Exam | | 25 | Exam to assess students' mastery of the material for Sub-CLO 5 to Sub-CLO 7 |
| | **Total Weight (%)** | | **100** | |