



Learning course:	Mathematical Models for Public Administration
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Period	Total lessons	Theoretical lessons	Practical lessons	Credits
Third	3 hours	1 hours	2 hours	4

Learning Area:	Knowledge application
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Previous learning courses	Following learning courses
No	No

Date of elaboration: 15 of octubre of 2021	Elaborated by: Dr. Juan Carlos Patiño
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Learning objective:
In this course, students will study different mathematical methods in order to conduct proper quantitative research. They will practice by using special computer software. In the end of this course, students will be able to distinguish different mathematical models in public administration, to estimate the parameters by using public data and econometric software, to test the underlying assumptions and to evaluate the results. They will have learned to test simple hypotheses about behavior in government affairs, to forecast the behavior of variables, and to simulate public policy. Finally, students will learn a variety of mathematical models and methods.

Content course:

- 1. Linear and regression models**
 - 1.1 The linear model
 - 1.2 Linear models classification. Gauss-Markov model.
 - 1.3 The regression models : Simple linear regression model.
 - 1.4 Testing Assumptions of Linear Regression model
- 2. Residual Analysis in regression models.**
 - 2.1 Normality assumptions and residuals
 - 2.2 Weighted least squares.
 - 2.3 First-order autocorrelation
 - 2.4 Testing Assumptions of Linear Regression model
- 3. Multiple linear regression model**
 - 3.1 The multiple linear regression model
 - 3.2 Maximum likelihood estimators and least squares
 - 3.3 Parameters estimation and correlation in multiple linear regression
 - 3.4 ANOVA table
 - 3.5 Testing Assumptions of multiple linear regression model

Learning activities: The learning course is transversal to the program and its purpose is to provide students elements to support and give sufficient rigour to the methodological approach of the research work, developed from the first academic period of the program. The main purpose is that the students show their abilities by using mathematical models in their final papers related to their research projects.

Assessment criteria:



Learning outcomes assessed	Percentage
Written exam test	30
Practices	30
Final project	40
Total:	100

Bibliography:

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14. Reyes Mora, S. y A. Santiago Santos (2017). Modelos matemáticos en biología, ciencias sociales e ingeniería. Oaxaca: Universidad Tecnológica de la Mixteca.
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