INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FACULTY OF SCIENCE AND DATA ANALYTICS
DEPARTMENT OF STATISTICS
STATISTICS UNDERGRADUATE PROGRAM

Course	Course Name	:	**Introduction to Spatial Statistics**
	Course Code	:	SS234752
	Credit	:	3 SKS
	Semester	:	VII

COURSE DESCRIPTION

The objectives of the spatial statistics course are the students able to design the data collection based on location and analyze the spatial data particularly in the health and environment sectors, and able to interpret the result. The theoretical material from basic spatial concepts to various methods of spatial analysis is conveyed through lectures and discussions. Improving the analytical skills, students are given examples of relevant cases. These examples are resolved with and without software through a practicum in class. In addition, students are given assignments both independently and in groups to find out the application of various real problems, particularly in the environmental and health sectors. The objective of these assignments is to prepare students to be able to manage and work in teams and to be responsible for the results of individual and group work

PROGRAM LEARNING OUTCOME

PLO-5	Able to apply statistical theory to statistical methods
PLO-7	Able to use modern computing devices to solve statistical problems
PLO-9	Able to apply statistical methods to analyze theoretical and real problems

COURSE LEARNING OUTCOME

CLO.1	Able to explain the concept of spatial statistics and its implementation in various fields
CLO.2	Be able to explain analytical procedures in spatial statistics and be able to choose the appropriate method
CLO.3	Able to use computational techniques and modern computer equipment needed to process spatial data
CLO.4	Able to identify, formulate, and analyze spatial data with effective methods and according to the problem
CLO.5	Able to use computational techniques and modern computer that required to analyze the spatial data
CLO.6	Have insight about the current issue and upcoming issue relating to the biostatistics
CLO.7	Able to communicate effectively and collaborate with the teams in interdisciplinary and multidisciplinary
CLO.8	Have responsibilities and professional ethics
CLO.9	Able to motivate themself to think creatively and lifelong learning

MAIN SUBJECT

1. Definition of spatial statistics and some of its applications in various fields
2. Spatial data structures (geostatistics, lattices, and point patterns), isotropy and anisotropy,

stationary and non-stationary

3. Spatial data exploration (Exploratory Spatial Data Analysis: ESDA)
4. Introduction to spatial point process
5. Properties of spatial point process: first and second order moment, Poisson point process
6. Intensity modeling, K-function and pair correlation function, Cox point process
7. Prediction and interpolation (geostatistics: ordinary kriging, variogram)
8. Spatial regression modeling with area basis (SAR, SEM, SARMA)
9. Spatial regression modeling on a point basis (GWR, GWLR, GWPR)

PREREQUISITE

Regression Analysis, Mathematical Statistics

REFERENCES

1. Anselin, L. 1988. Spatial Econometrics: Methods and Models. Dordrecht: Kluwer Academic Publishers.
2. Baddeley, A., Rubak, E., & Turner, R. 2015. Spatial point patterns: methodology and applications with R. CRC press.
3. Fotheringham, A.S., Brundson, C., and Charlton, M. 2002. Geographically Weighted Regression: the analysis of spatially varying relationships. England : John Wiley dan Sons Ltd.
4. Anselin, L. and Rey, S.J., 2010. Perspective on Spatial Data Analysis. Springer.
5. Arbia, G. 2006. Spatial Econometrics: Statistical Foundations and Applications to Regional Convergence. Berlin: Springer.
6. Cressie, N. 2015. Statistics for spatial data. John Wiley & Sons.
7. Ficher, M.M. and Getis, A., 2010. Handbook of Applied Spatial Analysis Software Tools, Methods and Applications. Springer-Verlag Berlin Heidelberg