



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

Course

Course Name	:	Computational Statistics
Course Code	:	SS234206
Credit	:	4 SKS
Semester	:	II

COURSE DESCRIPTION

This course aims to equip students with R and Python programming skills and then formulate problem solving using the basics of computational algorithms for statistical methods. This course focuses on the role of computing as a fundamental tool in data analysis, statistical inference, and for the development of statistical theories and methods. The material is delivered through interactive lectures, discussions, exercises, practicums and Problem Based Learning (PBL).

PROGRAM LEARNING OUTCOME

- PLO-4 Able to apply science and mathematics to support the understanding of statistical methods
- PLO-7 Able to use modern computing devices to solve statistical problems
- PLO-8 Able to use computational techniques to solve statistical problems

COURSE LEARNING OUTCOME

- CLO.1 Able to explain the structure of R and Python programming
- CLO.2 Be able to explain the basics of descriptive statistics program algorithms and implement them in the Statistics package program
- CLO.3 Be able to explain the basics of computational program algorithms for parameter estimation of one, two and k populations as well implement it in the Statistics package program
- CLO.4 Be able to explain the basic algorithms of linear and non-linear regression analysis computational programs as well as checking error assumptions and implement them in the Statistics package program
- CLO.5 Able to understand basic program algorithms for computational bootstrap and jackknife regression and implement them in the Statistics package program
- CLO.6 Able to understand the basic random number generation algorithm and implement it in the Statistics package program
- CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams

MAIN SUBJECT

1. Introduction to R
2. Descriptive statistics computation using R
3. Estimation and Testing of Parameters One, Two and k Populations using R
4. Linear and non linear regression analysis and error assumption checking using R
5. Bootstrap and Jackknife regression using R

6. Descriptive statistics computation using Python
7. Estimation and Testing of Parameters One, Two and k Populations using Python
8. Linear and non linear regression analysis and error assumption checking using Python
9. Bootstrap and Jackknife regression using Python
10. Random number generator

PREREQUISITE

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REFERENCES

1. Rizzo, M. L. 2017. Statistical Computing with R. Chapman dan Hall/ CRC Computer Science dan Data Analysis.
2. Halswanter, T. 2022. An Introduction to Statistics with Python. Springer
3. Manly, B. F. J. 1997. Randomization, Bootstrap and Monte Carlo Method in Biology. London : Chapman and Hall.
4. Efron, B. and Tibshirani, R. J. 1993. An Introduction to the Bootstrap. Chapman and Hall, Inc