TEACHING-LEARNING CONTRACT

LEARNING PROGRAM OUTLINE

LEARNING UNIT PROGRAM

STATISTICS COMPUTATION

PAS 136

STATISTICS STUDY PROGRAM OF MATHEMATICS DEPARTMENT
MATHEMATICS AND SCIENCE FACULTY
DIPONEGORO UNIVERSITY
SEMARANG
2007

TEACHING-LEARNING AGREEMENT

Course Title	:	Statistics Computation
Code	:	PAS 136
Credit	:	3
Semester	:	VI

1. **Course Advantage**

   Statistic tools and methods always develop together with computation necessity. Some computation tools are available for some statistics methods, but some others have not available yet. In this case, user-defined programs are needed. One of the modern and popular computer software is S-PLUS. Programming utility is available beside instantaneous utility. After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming.

2. **Course Description**

   Statistics Computation course consist computer intensive learning to obtain solution for statistical problems. S-PLUS software is chosen for this purpose, because it fully equipped with programming utility beside instantaneous tools as well as other software. By this way, the computation of new methods can be prepared by user-defined program. High quality graphical utility also available so that analytic computation and graphical visualization can be integrated in a report.

3. **General instruction Aim**

   After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming.

4. **Lecturing Strategy**

   Lecturing methods consist of presentation, discussion, assignment, and computer intensive practicing. Lecture presentation is aimed to build a basic concept of statistics computation. Discussion is aimed to build learning experience that will build strong bases for students. Assignments are aimed to measure the competence achievement. Computer practicing is aimed to build ability on computer programming.

5. **Reference**

- Conover, W.J, *Practical Nonparametric Statistics,* John Wiley, 1990
- Efron, B. *An Introduction to the Bootstrap,* Chapman and Hall, 1993
- Ross, S.M *Introduction to Probability Models* Academic Press, 1997

- Rukun Santoso dan Budi Warsito, , 2005, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang
- S-Plus User Guide 1995

6. Assignment

- Quiz will be given every two chapter finished.
- Computer intensive practicing is done individually refer to practical guideline.
- Mid-semester evaluation and final evaluation are given in open book system.

7. Scoring criteria

Score criteria of achievement level are:

Grade	Point	Range
A	4	A≥3,75
AB	3,5	3,25 ≤A B < 3,75
B	3	2,75 ≤ B< 3,25
BC	2,5	2,25≤ BC<2,75
C	2	1,75≤C< 2,25
CD	1,5	1,25≤CD<1,75
D	1	0,75≤D<1,25
E	0	E<0,75

Final point decided by three components:

Assignment and quiz	10%
Mid semester evaluation	25%
Final evaluation	40%
Computer practicing	25%

LEARNING PROGRAM OUTLINE

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**

Brief Description : Statistic Computation course is given in 5th semester. The focus of this course is strengthen the algorithm and programming capability that be implemented in statistic methods.

General Aim Instruction : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

No.	Special Instruction Aim	Subject	Sub subject	Time estimation	References
1,2	After studying this chapter students are expected be able to operate S-PLUS software	Basic of S-PLUS	- Basic syntax of S-PLUS	150 minutes	4.
2	After studying this chapter, students are expected be able to make simple function in S-PLUS code	Basic of S-PLUS programming	- Available function - User defined function	150 minutes	4.
3	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for Exploratory Data Analysis	Exploratory Data Analysis	- Exploratory Data Analysis	150 minutes	4
4	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for random data generation.	Random data	- Random data concept - Advantage of random data - Simulation if Inverse Transformation method	150 minutes	2,3,4
5	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for statistical simulation	Statistical simulation	- Simulation of Central Limit Theorem - Simulation of Bootstrap method	150 minutes	1,2,3,4

6	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for random data generation from any probability distribution	Probability distribution	- General Probability distribution - Random data from general distribution	150 minutes	2,3,4
7	After studying this chapter, students are expected be able to make graphically visualization of special probability distribution and explain the properties, i.e. Normal, Student t, Log-normal, Beta, Cauchy, Chi-squared, Exponential, F, Gamma, Stable, Binomial, Geometric, Hyper geometric, Logistic, Negative binomial, Poisson, Uniform, Weibull, and Wilcox on	Probability distribution	Special Probability distribution	150 minutes	2,3,4
8	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for distribution goodness of fit	Distribution goodness of fit	- Kolmogorov-Smirnov distribution goodness of fit - Chi-squared Distribution goodness of fit	150 minutes	1,4
9	Mid semester evaluation	Evaluation	- Evaluation	150 minutes	1,2,3,4
10	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for multivariate distribution goodness of fit	Multivariate distribution goodness of fit	- Multivariate distribution - Multivariate normal distribution - Multivariate normal goodness of fit	150 minutes	1,4
11	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming to solve linear models especially linear regression model	Linear models	- Kinds of model - Model interaction - Linear regression model	150 minutes	1,4
12	After studying this chapter, students are expected be able to compose algorithm and	Linear models	- Solution of regression		1,4

	translation into S-PLUS programming to solve classical linear regression model violation		model violation	150 minutes	
13	After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming to solve multicolinearity by principal component method.	Linear models	- Solution of regression model violation	150 minutes	1,4
14	Final evaluation	Evaluation	- Evaluation	150 minutes	1,2,3,4

Statement notes:

Classroom activity : 12x150 minutes
Structural activity : 12x150 minutes
Home work : 12x150 minutes

Reference

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B. *An Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **1st**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming.
2. Specific : After studying this chapter students are expected be able to operate S-PLUS software

B. Subject : Basic of S-PLUS programming

C. Sub Subject : Basic of S-PLUS programming

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	Explaining about contents of first meeting, basic of statistics computation and competence of instruction aim.	Observing and taking notes	LCD
Presentation	Explaining the basic syntaxes of S-PLUS software, giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **2nd**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to make simple function in S-PLUS code.

B. Subject : Basic of S-Plus programming

C. Sub Subject : Available function, user defined function

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 2nd meeting. ▪ Explaining about function in S-PLUS ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining about procedure of user defined function in S-PLUS ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics,* John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap,* Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **3rd**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for Exploratory Data Analysis

B. Subject : Exploratory Data Analysis

C. Sub Subject : Exploratory Data Analysis

D. Lerning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 3rd meeting. ▪ Explaining about exploratory data analysis concept ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Visualizing and explaining about data dispersion, density, outlier, and descriptive statistic. ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics,* John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap,* Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **4^{th}**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for random data generation.

B. Subject : Random data

C. Sub Subject : Random data

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of fourth meeting. ▪ Explaining about use of random data ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining random data concept and use of random data. ▪ Generating random data with inverse transformation method ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **5th**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for statistical simulation.

B. Subject : Statistical simulation

C. Sub Subject : Statistical simulation

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 5th meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining computation simulation for Central Limit Theorem and Bootstrap methods. ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics,* John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap,* Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **6^{th}**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for random data generation from any probability distribution.

B. Subject : Probability distribution

C. Sub Subject : General Probability distribution

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 6^{th} meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining to generate random data from any probability distribution ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : 7^{th}

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to make graphically visualization of special probability distribution and explain the properties, i.e. Normal, Student t, Log-normal, Beta, Cauchy, Chi-squared, Exponential, F, Gamma, Stable, Binomial, Geometric, Hyper geometric, Logistic, Negative binomial, Poisson, Uniform, Weibull, and Wilcox on

B. Subject : Probability distribution

C. Sub Subject : Special Probability distribution

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 7^{th} meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining random data generation from special probability distributions and their graphically visualization. ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting.	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **8th**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for distribution goodness of fit.

B. Subject : Distribution goodness of fit

C. Sub Subject : Distribution goodness of fit

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 8th meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining of Kolmogorov-Smirnov and Chi-squared distribution goodness of fit methods. ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting..	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title	:	**Statistics Computation**
Code/Credit	:	**PAS 136/3**
Duration	:	**150 minutes**
Meeting in sequence	:	**8^{th}**
Subject	:	**Mid Semester Evaluation**

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **10^{th}**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming for multivariate distribution goodness of fit.

B. Subject : Multivariate distribution goodness of fit

C. Sub Subject : Multinormal distribution goodness of fit

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 10^{th} meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining about multivariate distribution probability, normal multivariate distribution and multinormal goodness of fit ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting..	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **11^{th}**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming to solve linear models especially linear regression model.

B. Subject : Linear models

C. Sub Subject : Solution of linear models

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 11^{th} meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining about linear models: interaction and solutions ▪ Giving examples ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting..	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **12^{th}**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming to solve classical linear regression model violation.

B. Subject : Linear models

C. Sub Subject : Solution of regression model violation

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 12^{th} meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Reviewing about violation of classical regression model ▪ Giving examples and solution ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment ▪ Introducing the next meeting..	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics,* John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap,* Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title : **Statistics Computation**
Code/Credit : **PAS 136/3**
Duration : **150 minutes**
Meeting in sequence : **13^{th}**

A. Instruction Aim

1. General : After studying this course, students are expected be able to construct an algorithm to obtain solution of statistical problems and translate this algorithm to S-PLUS computer programming..

2. Specific : After studying this chapter, students are expected be able to compose algorithm and translation into S-PLUS programming to solve multicolinearity by principal component method.

B. Subject : Linear models

C. Sub Subject : Solution of regression model violation

D. Learning Activity

Stage	Lecturer Activities	Students Activities	Learning Tools Media
Introduction	▪ Explaining contents of 13^{th} meeting. ▪ Explaining competence of instruction aim.	Observing and taking notes	LCD
Presentation	▪ Explaining algorithm and programming for principle component method ▪ Giving examples and solution ▪ giving exercises problem and assign students to solve it	Observing, taking notes, discussion, and doing exercises.	LCD, board, and personal computer.
Closure	▪ Reviewing student's activities result. ▪ Giving computation assignment	Observing and taking notes	LCD

E. Evaluation : Students competent measured by giving some individual homework exercises.

F. Reference :

1. Conover, W.J, *Practical Nonparametric Statistics*, John Wiley, 1990
2. Efron, B., *an Introduction to the Bootstrap*, Chapman and Hall, 1993
3. Ross, S.M *Introduction to Probability Models* Academic Press, 1997
4. Rukun Santoso dan Budi Warsito, *Modul Praktikum Komputasi Statistika*, Program Studi Statistika, Jurusan Matematika FMIPA UNDIP Semarang, 2005
5. S-Plus User Guide 1995

LEARNING UNIT PROGRAM

Course Title	:	**Statistics Computation**
Code/Credit	:	**PAS 136/3**
Duration	:	**150 minutes**
Meeting in sequence	:	**14^{th}**
Subject	:	**Final Evaluation**