



**TEACHING-LEARNING CONTRACT**  
**LEARNING PROGRAM OUTLINE**  
**LEARNING UNIT PROGRAM**

**NONPARAMETRIC**  
**REGRESSION**  
**PAS 130**

UPT-PUSTAK-UNNDIP
No. Daft: 0062/BA/PMIPA/C1
Tgl. : 16-6-'09

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

## **TEACHING-LEARNING CONTRACT**

**Course Title : Nonparametric Regression**

**Code /Credit : PAS 130/3**

**Semester : VII**

### **1. Course Advantage**

Nonparametric Regression is a method of data analyze with unknown form function . In this course include about assumption and model in Nonparametric Regression, techniques of Smoothing and election of optimal parameter smoothing and also goodness of fit of model

### **2. Course Description**

This course study about assumption and model of Nonparametric Regression , when Nonparametric Regression be used, methods of estimation of Nonparametric Regression are like : kernel method, orthogonal series, spline smoothing, k-NN smoothing , regressogram, median smoothing, delta dirac estimator and also method in election of parameter of smoothing are like : method of plug in, cross validation, penalizing function method and bootstrap method. Also studied the technique of Nonparametric Regression of correlation data and goodness of fit of the model.

### **3. General Instructional Aim**

After following this course, student will be able to analyze of data with Nonparametric Regression

### **4. Lecture Strategic**

This course method is given by explain of class. Clarification started with congeniality of definition concept, then given by problem example that related to given items . Besides given also problems for practice so that can be seen how long the understanding of student to existing items. Also given Self-Supporting Task.

## 5. References

- (1) Hardle, W., Applied Nonparametric Regression, 1990, Cambridge University Press
- (2) Bruce, A dan Gao, Hong-Ye, Applied wavelet Analysis with S-PLUS,, 1996, Springer, New York
- (3) Racine, J., Consistent Significance Testing for Nonparametric Regression, Departement of Economics, BSN 3403, University of South Florida, Tampa, FL

## 6. Task

Task will be given to minimize twice in one semester. Mid term evaluation given with closed book system and final evaluation given by making one handing out about lecturing items and presented.

## 7. Scoring Criteria

Criteria of scoring in this course is

Nilai	Point
A	4
AB	3,5
B	3
BC	2,5
C	2
CD	1,5
D	1
E	0

Scoring in this course title consist of three component, that are task and examination. Examination will be held twice, that is mid-term and final exam. Midterm exam is arranged after seventh lecturing, while final exam item is arranged after fourteenth lecturing.

Final score decision is based on this scoring indicator such as:

No	Component	Percentage
1	Task	20 %
2	Midterm	30 %
3	Final Exam	50 %
	<b>TOTAL</b>	<b>100%</b>

## 8. Lecture Schedule

Week	Material	Reference
1	Teaching-learning contract, Introduction of learning.	
2	Nonparametric regression: Common Model, common Assumption, estimation of Least square of nonparametric regression, design model.	[1] 3 - 23
3	Smoothing Technique: kernel Technique, orthogonal series Technique	[1] 23-74 [2] 38-44
4	Smoothing Technique: k-NN Technique, regressogram, median smoothing	[1] 23-74 [2] 38-44
5	Practice in laboratory computation.	[1] 23-74 [2] 38-44
6	Smoothing Technique: delta dirac series estimator , Spline smoothing	[1] 23-74 [2] 38-44
7	Practice in laboratory computation.	[1] 23-74 [2] 38-44
8	Mid term	

9	Selection methods of parameter smoothing : cross validation method	[1] 147-189
10	Selection methods of parameter smoothing : penalizing function method, plug in method.	[1] 147-189
11	Selection methods of parameter smoothing : Bootstrap method	[1] 147-189
12	Practice in laboratory computation.	[1] 147-189
13	Technique of nonparametric regression to correlation data : non parametric prediction of time series, Smoothing of dependent error .	[1]203-216
14	Goodness of fit test of nonparametric regression.	[3] 1-16
15	Practice in laboratory computation.	[1]203-216 [3] 1-16
16	Final Exam	

## LEARNING PROGRAM OUTLINE

Course Title : Nonparametric Regression

Code / Credit : PAS 130 / 3

Course Description : Nonparametric Regression is a method of data analyze with unknown form function . In this course include about assumption and model in Nonparametric Regression, techniques of Smoothing and election of optimal parameter smoothing and also goodness of fit test of model

General Instructional Aim : After following this course, student will be able to analyze data with Nonparametric Regression

No.	Specific Instructional Aim	Subject	Sub Subject		References
1	After studying this course, students are expected to have ability to explain common model, assumption and design model in non parametric regression	nonparametric regression model	<ul style="list-style-type: none"><li>▪ Common Model</li><li>▪ Common Assumption</li><li>▪ Least square estimation of nonparametric regression</li><li>▪ Design model</li></ul>	1X150 minutes	[1] 3 - 23
2	After studying this course, students are expected to have ability to application non parametric regression	Smoothing technique	<ul style="list-style-type: none"><li>▪ Kernel Technique</li><li>▪ orthogonal series Technique</li><li>▪ k-NN Technique</li><li>▪ Regressogram,</li></ul>	5x150 minutes	[1] 23-74 [2] 38-44

	technique.		Technique <ul style="list-style-type: none"> <li>▪ Spline smoothing</li> <li>▪ Delta dirac series estimator</li> <li>▪ Median Smoothing</li> </ul>		
3	After studying this course, students are expected to have ability to find smoothing parameter optimal.	Selection of parameter smoothing	<ul style="list-style-type: none"> <li>▪ Cross validation method</li> <li>▪ penalizing function method</li> <li>▪ plug in method</li> <li>▪ Bootstrap method</li> </ul>	4x150 minutes	[1] 147-189
4	After studying this course, students are expected to have ability to application nonparametric Technique in correlation data model	nonparametric Technique in correlation data model	<ul style="list-style-type: none"> <li>▪ Prediction of non parametric of time series</li> <li>▪ Smoothing with dependent error</li> </ul>	150 minutes	[1]203-216
5	After studying this course, students are expected to have ability to test of goodness of fit of non parametric regression	goodness of fit of non parametric regression	<ul style="list-style-type: none"> <li>▪ Bootstrap method</li> </ul>	2X150 minutes	[3] 1-16

## **6. References :**

- (1) Hardle,W., Applied Nonparametric Regression,1990,Cambridge University Press
- (2) Bruce,A dan Gao,Hong-Ye, Applied wavelet Analysis with S-PLUS,,1996,Springer,New York
- (3) Racine,J., Consistent Significance Testing for Nonparametric Regression, Departement of Economics, BSN 3403, University of South Florida, Tampa,FL



## LEARNING UNIT PROGRAM

COURSE TITLE : Nonparametric Regression

CODE / CREDIT : PAS 130 / 3

DURATION : 2X150 MINUTES

WEEK : 1 and 2

### A. INSTRUCTIONAL AIM :

1. GENERAL : After following this course, student will be able to analyze of data with Nonparametric Regression
2. SPECIFIC : After studying this course, students are expected to have ability to explain common model, assumption and design model in nonparametric regression

B. SUBJECT : Non parametric regression model

C. SUB SUBJECT :

- Common model and assumption.
- Least square estimation of non parametric regression
- Design model

### D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Explain learning contract. 2. Describing about general and specific objectives competence 3. Describing about matter at the first and second meeting	Observing and taking notes	OHP, transparancy, white board, reference book, and paper

	4. Giving motivation to student for the importance to understanding this matter to make easy the next matter.		
PRESENTATION	Explaining about nonparametric regression, common model, assumption and design model, estimation of non parametric regression and give counter examples.	Observing, asking, taking notes	OHP, transparency, white board, reference book, and paper
CLOSING	1. Giving tasks for take home 2. Giving outline learning and description about matter on the next meeting	Discuss, asking, observing, taking notes	white board and paper

E. ASSESSMENT : Giving problems to the students.

F. REFERENCE :

[1]. Hardle, W., Applied Nonparametric Regression, 1990, Cambridge University Press

## LEARNING UNIT PROGRAM

COURSE TITLE : Nonparametric Regression

CODE / CREDIT : PAS 130 / 3

DURATION : 5X150 MINUTES

WEEK : 3,4,5,6 and 7

### A. INSTRUCTIONAL AIM :

1. GENERAL : After following this course, student will be able to analyze of data with Nonparametric Regression
2. SPECIFIC : After studying this course, students are expected to have ability to application non parametric regression Technique.

B. SUBJECT : Smoothing Technique

C..SUB SUBJECT :

- kernel Technique
- orthogonal series Technique
- k-NN Technique
- Regressogram Technique
- Spline Technique
- Delta dirac series estimator Technique
- Median Technique

### D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1.Describing about general and specific objectives competence 2.Describing about matter at the three until seven	Observing and taking notes	OHP, transparency, white board, reference book, and paper

	meeting 3. Giving motivation to student for the importance to understanding this matter to make easy the next matter.		
PRESENTATION	1. Explaining about non parametric regression Technique and its application for example : <ul style="list-style-type: none"> <li>◆ kernel Technique</li> <li>◆ orthogonal series Technique</li> <li>◆ k-NN Technique</li> <li>◆ Regressogram Technique</li> <li>◆ Spline Technique</li> <li>◆ Delta dirac series estimator Technique</li> <li>◆ Median Technique</li> </ul> 2. Giving counter examples and practice in computation laboratory	Observing, asking, taking notes	OHP, transparency, white board, reference book, and paper
CLOSING	<ul style="list-style-type: none"> <li>▪ Giving tasks for take home</li> <li>▪ Giving outline learning and description about matter on the next meeting</li> </ul>	Discuss, asking, observing, taking notes	white board and paper

E. ASSESSMENT : Giving problems to the students.

F. REFERENCE :

[1]. Hardle, W., Applied Nonparametric Regression, 1990, Cambridge University Press

## LEARNING UNIT PROGRAM

COURSE TITLE : Nonparametric Regression

CODE / CREDIT : PAS 130 / 3

DURATION : 5X150 MINUTES

WEEK : 9 until 12

### A. INSTRUCTIONAL AIM :

1. GENERAL : After following this course, student will be able to analyze of data with Nonparametric Regression
2. SPECIFIC : After studying this course, students are expected to have ability to find smoothing parameter optimal.

B. SUBJECT : Selection methods of parameter smoothing

C. SUB SUBJECT :

- cross validation method
- penalizing function method
- plug in method
- Bootstrap method

### D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ol style="list-style-type: none"><li>1. Describing about general and specific objectives competence</li><li>2. Describing about matter at the nine until twenty meetings</li><li>3. Giving motivation to student for the importance to understanding this matter</li></ol>	Observing and taking notes	OHP, transparency, white board, reference book, and paper

	to make easy the next matter.		
PRESENTATION	<ol style="list-style-type: none"> <li>1. Explaining about selection method parameter smoothing for examples : cross validation method ,penalizing function method, plug in method and Bootstrap method</li> <li>2. Giving counter examples and practice in computation laboratory</li> </ol>	Observing, asking, taking notes	OHP, transparency, white board, reference book, and paper
CLOSING	<ol style="list-style-type: none"> <li>1. Giving tasks for take home</li> <li>2. Giving outline learning and description about matter on the next meeting</li> </ol>	Discuss, asking, observing, taking notes	white board and paper

E. ASSESSMENT : Giving problems to the students.

F. REFERENCE :

[1]. Hardle,W., Applied Nonparametric Regression,1990,Cambridge University Press

## LEARNING UNIT PROGRAM

COURSE TITLE : Nonparametric Regression

CODE / CREDIT : PAS 130 / 3

DURATION : 150 MINUTES

WEEK : 13

### A. INSTRUCTIONAL AIM :

1. GENERAL : After following this course, student will be able to analyze of data with Nonparametric Regression
2. SPECIFIC : After studying this course, students are expected to have ability to application non parametric Technique in correlation data model

B. SUBJECT : Nonparametric technique in correlation data model

C.SUB SUBJECT :

- Prediction of non parametric of time series
- Smoothing with dependent error

### D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ol style="list-style-type: none"><li>1. Describing about general and specific objectives competence</li><li>2. Describing about matter at this meeting</li><li>3. Giving motivation to student for the importance to understanding this matter to make easy the next matter.</li></ol>	Observing and taking notes	OHP, transparency, white board, reference book, and paper

PRESENTATION	1. Explaining about non parametric Technique in correlation data model 2. Giving counter examples and practice in computation laboratory	Observing, asking, taking notes	OHP, transparency, white board, reference book, and paper
CLOSING	3. Giving tasks for take home 4. Giving outline learning and description about matter on the next meeting	Discuss, asking, observing, taking notes	white board and paper

E. ASSESSMENT : Giving problems to the students.

F. REFERENCE :

[1]. Hardle, W., Applied Nonparametric Regression, 1990, Cambridge University Press



## LEARNING UNIT PROGRAM

COURSE TITLE : Nonparametric Regression

CODE / CREDIT : PAS 130 / 3

DURATION : 2X150 MINUTES

WEEK : 14 until 15

### A. INSTRUCTIONAL AIM :

1. GENERAL : After following this course, student will be able to analyze of data with Nonparametric Regression
2. SPECIFIC : After studying this course, students are expected to have ability to test of goodness of fit test of nonparametric regression.

B. SUBJECT : goodness of fit test of non parametric regression

C..SUB SUBJECT : Bootstrap method

### D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	<ol style="list-style-type: none"><li>1. Describing about general and specific objectives competence</li><li>2. Describing about matter at the fourteen and fifteen meetings</li><li>3. Giving motivation to student for the importance to understanding this items to make easy the next matter.</li></ol>	Observing and taking notes	OHP, transparency, white board, reference book, and paper

PRESENTATION	1. Explaining about goodness of fit of non parametric regression with bootstrap method. 2. Giving counter examples and practice in computation laboratory	Observing, asking, taking notes	OHP, transparency, white board, reference book, and paper
CLOSING	1. Giving tasks for take home 2. Giving outline learning and description about final exam	Discuss, asking, observing, taking notes	white board and paper

E. ASSESSMENT : Giving problems to the students.

F. REFERENCE :

[3] Racine, J., Consistent Significance Testing for Nonparametric Regression,  
Departement of Economics, BSN 3403, University of South Florida, Tampa,FL