TEACHING-LEARNING CONTRACT
LEARNING PROGRAM OUTLINE
LEARNING UNIT PROGRAM

ADVANCED DESIGN OF EXPERIMENTS
PAS 225

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

TEACHING – LEARNING CONTRACT

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Semester :6

1. Course Advantage

This course is an applied statistics in research. Very useful to analyse a research at industrial, health, biological, agriculture, education area and the other area which need a research of attempt. The analysis was discussed in this course as advanced analysis of variance, so that very needed by advanced researcher.

2. Course Description

Election of design which is used in research, treatment in concerned, the number of respon, and aim of the research will determine needed analysis form. In this course will be studied about : subsampling design, regression approached for design of experiment, analysis of covariance, multivariate analysis of variance, repeated measurement design, spli block design, 3-factor factorial design, split plit plot design and split plit block design.

3. General Instructional Aim

After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.

4. Lecture Strategic.

To reach the target of this course this study system use two way teaching methods, that are lecturing and discussing. To increase the activity of student are given some assignation in the form of quiz in the class, and task that self done at home. This course is also performed by praktikum with program package are SAS 6.12 and minitab 13.

5. References

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)

3. . Montgomery, D.C. (2005). Design and Analysis of Experiments. 6 nd Edition. John Willey & Sons. Inc.

4. Sharma, S. (1996). Applied Multivariate Techniques. John Willey & Sons. Inc.

5. Stell, R.G.D and Torrie, J.H. (1991). Prinsip dan Prosedur Statistika: suatu pendekatan biometri. Penerbit PT Gramedia Pustaka Utama, Jakarta. (Alih bahasa : Ir. Bambang Sumantri (Institut Pertanian Bogor)).

6. .....; (1990). SAS/STAT User's Guide, Version 6, Fourth Edition. Volume 1. SAS Institute Inc. SAS Campus Drive. Cary, NC.27513. USA

7.....; (1997) Experimental Design for Researchers, Department of Statistics, Faculty of Information and Mathematical Science, Massey University, Australian.

8. Tatik Widiharih (2007). Modul Praktikum Rancangan Percobaan Lanjut. Laboratorium Matematika, FMIPA UNDIP

6. Scoring Criteria.

Criteria of scoring in this course is :

scoring	value
A	4.0
AB	3.5
B	3.0
BC	2.5
C	2.0
CD	1.5
D	1.0
DE	0.5
E	0.0

Determination of scoring criteria is used weighted such as :

No	Component	Percentage
1	Quiz	10
2	Self-done task	15
3	Praktikum	15
4	Midterm	25
5	Final exam	35

7. Lecture Schedule

week	Material	references
1	1. Teaching-learning contract 2. Subsampling randomized design 3. Subsampling randomized block design	[1] : 85-97 218-228 [2] : 248-254
2&3	Regression approached for: • Randomized design • 2 factor factorial design	[3] : 107-110 188-193
4&5	Analysis of covariance for : • Randomized design • Randomized block design • Latin square design • 2 factor Factorial design	[1] : 503-567 [2] : 437-467 [3] : 574-467 [5] : 480-510
6	Multivariate Analysis of Variance	[4] : 342-370
7	Repeated measurement design	[2] : 262-276
8	Midterm	
9	Praktikum 1	[6] , [7], [8]
10	Split block design	[1] : 432-449 [2] : 111-119 [5] : 466-472
11&12	3 factor factorial design : • Randomized design • Randomized block design	[1] : 450-476 [2] : 143-158
13	Split plit plot design	[1] : 477-502 {2] : 158-171
14	Split plit block design	[1] : 477-502 {2] : 158-171
15	Praktikum 2	[6], [7], [8]
16	Final exam	

LEARNING PROGRAM OUTLINE

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Semester :6

Course Description

Election of design which is used in research, treatment in concerned, the number of respon, and aim of the research will determine needed analysis form. In this course will be studied about : sub sampling design, regression approached for design of experiment, analysis of covariance, multivariate analysis of variance, repeated measurement design, spli block design, 3-factor factorial design, split plit plot design and split plit block design.

General Instructional Aim

After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.

No	Specific Instructional Aim	Subject	Sub Subject	duration	References
1	The students can to mention the aim, advantage and process of studying	Teaching – learning contract	General instructional aim Relevance this course to another course Evaluation and scoring criteria	20 minutes	-
2	The Student can analyse for sub sampling design.	Sub sampling design	1.Subsampling randomized design 2.Subsampling randomized block design	130 minutes	[1] : 85-97 218-228 [2] : 248-254
3	The students can detemine optimal point	Regression approached	- Regression approached for randomized desing - Regression approached for 2 factor factorial design	6x50 minutes	[3] : 107-110 188-193
4	The student can analyse for analysis of covariance	Analysis of covariance	Analysis of covariance for : 1. randomized design 2.randomized block desing	6x50 minutes	[1] : 503-567 [2] : 437-467 [3] : 574-467

			3. latin square design 4. 2 factor factorial design		[5] : 480-510
5	The students can analyse for multirespon design	Manova	Manova for : 1. Randomized design 2. randomized block design 3. General Manova	3x50 minutes	
6	The student can analyse for repeated measurement design	Repeated measurement design	1. Randomized intime 2.Randomized block intime 3. General repeated measurement	3x50 minutes	[2] : 262-276
7	The student can analyse for split block design	Split block design	1. Linear model 2. Analysis of variance 3. Comparing pairs of treatment means 4. Adequacy checking	3x50 minutes	[1] : 432-449 [2] : 111-119 [5] : 466-472
8	The student can analyse for 3 factor design	Three factor design	1. 3 factor Factorial 2. Split plit plot 3. Split plit block	12x50 minutes	[1] : 450-502 [2] : 143-171 [3] : 182-188

References

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)

3. . Montgomery, D.C. (2005). Design and Analysis of Experiments. 6 nd Edition. John Willey & Sons. Inc.

4. Sharma, S. (1996). Applied Multivariate Techniques. John Willey & Sons. Inc.

5. Stell, R.G.D and Torrie, J.H. (1991). Prinsip dan Prosedur Statistika: suatu pendekatan biometri. Penerbit PT Gramedia Pustaka Utama, Jakarta. (Alih bahasa : Ir. Bambang Sumantri (Institut Pertanian Bogor)).

6. ----------, 1990. SAS/STAT User's Guide, Version 6, Fourth Edition. Volume 1. SAS Institute Inc. SAS Campus Drive. Cary, NC.27513. USA

7. ----------, 1997 Experimental Design for Researchers, Department of Statistics, Faculty of Information and Mathematical Science, Massey University, Australian.

8. Tatik Widiharih (2007). Modul Praktikum Rancangan Percobaan Lanjut. Laboratorium Matematika , FMIPA Undip.

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 150 minutes

Week : 1

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.

2. Specific : The Student can to make analyse for subsampling design

B. SUBJECT : Subsampling design

C. SUB SUBJECT : 1. Introduction

2. Subsampling randomized design

3. Subsampling randomized block design

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1.Submitting teaching-learning contract 2. Explaining relevance this course with the other course 3.Explaining general aim	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining concept of subsampling 2.Explaining randomized design with subsampling about : linear model, data layout, anova, comparing means, adequacy checking, follow the example of applying and give task. 3. Explaining randomized block design with	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	subsampling about : linear model, data layout, anova, comparing means, adequacy checking, follow the example of applying and give task.		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at week 2.	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 6x50 minutes

Week : 2, 3

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The students can detemine optimal point

B. SUBJECT : Regression approached

C. SUB SUBJECT : - Regression approached for randomized design
- Regression approached for 2 factor factorial design

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2. Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1. Explaining relevance between regression with design 2. Explaining orthogonal polinomial regression 3. Explaining the way of determining order of regression pursuant to tables of anova 4. Explaining the way of	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	determining equation of regression 5. Explaining the way of determining optimal point 6..Giving example 7.Giving task to be done student		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Montgomery, D.C. (2005). Design and Analysis of Experiments. 6 nd Edition. John Willey & Sons. Inc.

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 6x50 minutes

Week : 4, 5

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The student can analyse for analysis of covariance

B. SUBJECT : Analysis of Covariane

C. SUB SUBJECT : Analysis of covariance for :

1. Randomized design
2. Randomized block desing
3. Latin square design
4. 2 factor factorial design

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2. Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining when anacova needed 2. Explaining assumption which is needed in anacova	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	3. Explaining anacova for randomized design, to covering : linear model, tables of anacova, treatment mean accommodated and comparing test , adequacy checking, follow the example of practice and applying 4. Explaining anacova for randomized block design, to covering : linear model, tables of anacova, treatment mean accommodated and comparing test , adequacy checking, follow the example of practice and applying 5. Explaining anacova for latin square design, to covering : linear model, tables of anacova, treatment mean accommodated and comparing test, adequacy checking, follow the example of practice and applying 6. Explaining anacova for Factorial 2 factor, covering : linear model, tables of anacova, treatment mean accommodated and comparing test, adequacy checking, follow the example of practice and applying		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)

3. Montgomery, D.C. (2005). Design and Analysis of Experiments. 6 nd Edition. John Willey & Sons. Inc.

4. Stell, R.G.D and Torrie, J.H. (1991). Prinsip dan Prosedur Statistika: suatu pendekatan biometri. Penerbit PT Gramedia Pustaka Utama, Jakarta. (Alih bahasa : Ir. Bambang Sumantri (Institut Pertanian Bogor)).

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 3x50 minutes

Week : 6

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The students can analyse for multirespon design

B. SUBJECT : Multivariete Analysis of Variance (Manova)

C. SUB SUBJECT : Manova for :

1. Randomized design
2. randomized block design
3. General Manova

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2.Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining principle of manova 2. Explaining manova for the randomized	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	design, test and assumption 3.Exemplifiing practice and applying 4. Explaining manova for the randomized block design, asumsi, and test. 5. Follow the example of applying and give task 6. Explaining manova in general		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Sharma, S. (1996). Applied Multivariate Techniques. John Willey & Sons Inc.

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 3x50 minutes

Week : 7

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The student can analyse for repeated measurement design

B. SUBJECT : Repeated measurement design

C. SUB SUBJECT : 1. Randomized intime

2.Randomized block intime

3. General repeated measurement

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1.Giving opportunity to student to ask previous items which not yet been mastered 2. Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining principle of repeated measurement. 2.Explaining randomized intime, linear model, anova, comparing means and adequacy checking.	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	3. Follow the example of applying and give task 4. Explaining randomized block intime, linear model, anova, asumsi, and test of means. 5. Follow the example of applying and give task 6. Explaining repeated measurement design in general.		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)

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LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 6x120 minutes

Week : 9, 15

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : After following this praktikum student can use package of SAS 6.12 and minitab 13 to: making program, reading output and give node of done analysis.

B. SUBJECT : Praktikum

C. SUB SUBJECT : 1.Subsampling design
2. Regression approached
3. Anacova
4. Manova
5. Split block design
6. Three factor design

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2. Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	computer

PRESENTATION	1.Explaining principle of package SAS 6.12 and minitab 2. Explaining GLM procedur for the : contrast of, anova, anacova, manova, repeated measurement, 3 factor design. 3. Explaining the way of determining equation of regression. 4. Explaining the way of determining optimal point. 5.Explaining output which can be given to done analysis.	Observing, asking, taking notes, doing task	computer
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	computer

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. ----------, 1990. SAS/STAT User's Guide, Version 6, Fourth Edition. Volume 1. SAS Institute Inc. SAS Campus Drive. Cary, NC.27513. USA

2. ----------, 1997 Experimental Design for Researchers, Department of Statistics, Faculty of Information and Mathematical Science, Massey University, Australian.

3. Tatik Widiharih (2007). Modul Praktikum Rancangan Percobaan Lanjut. Laboratorium Matematika , FMIPA Undip.

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 3x50 minutes

Week : 10

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The student can analyse for split block design

B. SUBJECT : Split block design

C. SUB SUBJECT : 1. Introduction
2. Linear model
3. Analysis of variance
4. Comparing means
5. Adequacy checking

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2. Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining when this design is needed. 2.Explaining linear model.	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	3.Explaining the anova table. 4. Explaining the way of test to comparing means. 5. Explaining the way of adequacy checking. 6. Follow the example of applying and give task		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)

3. Stell, R.G.D and Torrie, J.H. (1991). Prinsip dan Prosedur Statistika: suatu pendekatan biometri. Penerbit PT Gramedia Pustaka Utama, Jakarta. (Alih bahasa : Ir. Bambang Sumantri (Institut Pertanian Bogor)).

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 6x50 minutes

Week : 11, 12

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The student can analyse for 3 factor design

B. SUBJECT : Three factor design

C. SUB SUBJECT : Three factor factorial design

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2.Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining about 3 factor design. 2. Explaining 3 factor factorial in randomized design covering : linear model, tables of	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	anova, comparing means, adequacy checking, follow the example of applying and give task 3 Explaining 3 factor factorial in randomized block covering : linear model, tables of anova, comparing means, adequacy cheking, follow the example of applying and give task		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3.Describing material at next week	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Montgomery, D.C. (2005). Design and Analysis of Experiments. 6 nd Edition. John Willey & Sons. Inc.

3. Stell, R.G.D and Torrie, J.H. (1991). Prinsip dan Prosedur Statistika: suatu pendekatan biometri. Penerbit PT Gramedia Pustaka Utama, Jakarta. (Alih bahasa : Ir. Bambang Sumantri (Institut Pertanian Bogor)).

LEARNING UNIT PROGRAM

Course Title : Advanced Design of Experiments

Code : PAS 225

Credit : 3

Duration : 6x50 minutes

Week : 13, 14

A. INSTRUCTIONAL AIM

1. General : After studying this course, the student are expected to be able to make analyse in the form of anova, anacova, manova and analysis for repeated measurement design.
2. Specific : The student can analyse for 3 factor design

B. SUBJECT : Three factor design

C. SUB SUBJECT : 1. Split plit plot design

2. Split plit block design

D. TEACHING-LEARNING ACTIVITIES

STAGE	LECTURER ACTIVITIES	STUDENT ACTIVITIES	LEARNING MEDIA
INTRODUCTION	1. Giving opportunity to student to ask previous items which not yet been mastered 2.Explaining relevance this section with previous section 3.Explaining the material for this section	Observing and taking notes	OHP, transparancy White board
PRESENTATION	1.Explaining split plit plot design covering: linear model, tables of anova, comparing means, adequacy cheking, follow the example of	Observing, asking, taking notes, doing task	OHP, transparancy White board.

	applying and give task 2. Explaining split plit block design covering : linear model, tables of anova, comparing means, adequacy cheking, follow the example of applying and give task		
CLOSING	1. Giving comment to work student. 2. Giving task to be done at home 3. Giving material for final exam	Answering to, discussion	White board

E. ASSESSMENT : Giving problem to the students..

F. REFERENCES :

1. Gasper , V (1991). Teknik Analisis dalam Penelitian Percobaan. Penerbit Tarsito, Bandung.

2. Gomez, K.A and Gomez, A.A (1995). Prosedur Statistik untuk Penelitian Pertanian. Edisi ke 2. UI Press, Jakarta (Alih Bahasa : Endang Syamsudin dan Justika S. Baharsjah)