MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

COURSE OUTLINE DETAILS

1. Course: Applied statistics and Experimental design (Thống kê và phép thí nghiệm)
- **Code number:** AQ214
- **Credits:** 3
- **Hours:** 30 theory hours, 30 practice hours, 60 self-study

2. Management Unit:
- **Department:** Coastal aquaculture
- **Faculty:** College of Aquaculture and Fisheries

3. Requisites:
- **Prerequisites:** No
- **Corequisites:** No

4. Course objectives:

Objectives	Descriptions	Program Outcomes
4.1	To provide the basic knowledge about the probability and statistics, the method of experiment designs and data analysis in aquaculture	2.1.2.b
4.2	To train the student on the skills of experimental designs. Data collection and data analysis using statistical softwares	2.2.2
4.3	To train students to be independent, active, and critical thinking in doing research.	2.2.2
4.4	To develop a positive attitude toward aquaculture research and strengthen self/and team-study skills of experimental designs	2.3

5. Course learning outcomes:

COs	Descriptions	Objectives	POs
	Knowledge		
CO1	***The student must be able to recognize the basic knowledge about the probability and statistics:*** • Probability, Normal distribution, Student's t distribution, Chi square distribution, Fisher distribution; • Mean, range, min, max, medium, mode, percentile, type of data or variable (interval, nominal, rank)	4.1	2.1.2.b

COs	Descriptions	Objectives	POs
	Knowledge		
CO2	***The student must be able to outline the methods of experimental designs in aquaculture:*** • Indoor experiment design: Completely Randomized Design (CRD), • Outdoor: Completely Randomized Block Design (CRBD), Latin Square design (LSD) • Social economics research: Sampling methods; sample size, sample selection and collection data	4.1	2.1.2.b
CO3	***The student must be able to identify the data exploring and data explanation/interpreting the variation of data collected:*** • Descriptive statistics, hypothesis tests, comparison of means, one-way ANOVA, 2-way ANOVA, Correlation, linear/nonlinear regression, • Interpretation data via table, figure and diagram	4.1	2.1.2.b
	Skills		
CO4	***The student must be able to select method for data collection and analysis (using software):*** Students can prepare experimental areas, setup experiment, collect and analyze data collected in a precise and accuracy ways.	4.2, 4.3	2.2.2
CO5	***The student must be able to indicate statistical software to analyze experiment data:*** Student can employ the SPSS and Excel software to analyze data collected and interpret results by scientific writing forms	4.2, 4.3	2.2.2.
	Attitudes/Autonomy/Responsibilities		
CO6	Students must have good attitude and a sense of learning with high progressive spirit; complete assigned assignments independently	4.4	2.3

Note: "COs" means Course Outcomes; "POs" means Program Outcomes

6. Brief description of the course:

The course aims to provide to students theoretical, practical knowledge and skills in scientific research concept, statistics applied, experimental design and statistical analysis of data related to aquaculture research.

Theory: the student must be able to *(i)* recognize probability and statistical terms and principles of scientific research; *(ii)* to arrange a research work (*iii*) and to recognize the methods of experimental design and statistical analysis.

Practice: the student must be able to *(i)* apply/compute different research/and statistical tools; (*ii*) to apply design experiments; and (iii) to analyze data using common statistical software ; and *(v)* to write /and present research results in thesis.

7. Course structure:

7.1. Theory:

	Content	Hours	COs
Chapter 1.	**Probability Distributions**	**7**	
1.1.	Probability, probability distribution, Binomial distribution	2	CO1
1.2.	Normal probability distribution	1	CO1
1.3.	Sampling distribution of means	1	CO1
1.4.	Student's t distribution	1	CO1
1.5.	Chi square distribution	1	CO1
1.6.	Fisher distribution	1	CO1
Chapter 2.	**Population and sample**	**3**	
2.1.	Types of data	1	CO1
2.2.	Methods of data collection	1	CO1
2.3.	Descriptive of statistics	1	CO2
Chapter 3.	**Hypothesis Tests**	**3**	CO2, 3
3.1.	One-sample hypothesis	1	CO2, 3
3.2.	Two-sample hypothesis	1	CO2, 3
3.3.	Paired-sample hypothesis	1	
Chapter 4.	**Single-factor Experiments**	**5**	
4.1.	Analysis of variance (1-Way ANOVA)	2	CO3, 4
4.2.	Completely randomized design (CRD)	1	CO3, 4
4.3.	Randomized completely block design (RCB)	1	CO3, 4
4.4.	Latin square design (LS)	1	CO3, 4
Chapter 5.	**Two-factor Experiments**	**2**	
5.1.	Complete block design	1	CO3, 4
5.2.	Two-way ANOVA	1	CO3, 4
Chapter 6.	**Comparison Between Treatment Means**	**5**	
6.1.	Introduction	0.5	CO3, 4

6.2.	Least significant difference test (LSD)	1.5	CO3, 4
6.3.	Duncan's multiple range test	1.5	CO3, 4
6.4.	Tukey multiple range test	1.5	CO3, 4
Chapter 7.	**Correlation**	**2**	
7.1.	Pearson correlation	1	CO3, 4
7.2.	Spearman correlation	1	CO3, 4
Chapter 8.	**Regression**	**3**	
8.1.	Linear regression	1.5	CO 3, 4
8.2.	Non-linear regression	1.5	**CO 3, 4**

7.2. Practice:

	Content	Hours	COs
Unit 1.	**Descriptive statistics and calculating the statistics values**	**3**	
1.1.	Mean, medium, percentile	1	CO1, 4,5,6
1.2.	Rang (min, max) standard deviation, standard error of mean	2	CO1, 4,5,6
Unit 2.	**Hypothesis Tests**	**4**	
2.1.	Formal hypothesis test	1	CO2, 4,5,6
2.2.	One-sample hypothesis	1	CO2, 4,5,6
2.3.	Two-sample hypothesis	1	CO2, 4,5,6
2.4.	Paired-sample hypothesis	1	CO2, 4,5,6
Unit 3.	**Single-factor Experiments**	**6**	
3.1.	Analysis of variance (1_way ANOVA)	3.5	CO3, 4,5,6
3.2.	Completely randomized design (CRD)	1	CO3, 4,5,6
3.3.	Randomized completely block design (RCB)	1	CO3, 4,5,6
3.4.	Latin square design (LS)	0.5	CO3, 4,5,6
Unit 4.	**Two-factor Experiments**	**3**	
4.1.	Complete block design	2	CO3, 4,5,6
4.2.	2-Way ANOVA	1	CO3, 4,5,6
Unit 5.	**Comparison Between Treatment Means**	**6**	
5.1.	Least significant difference test (LSD)	2	CO3, 4,5,6
5.2.	Duncan's multiple range test	2	CO3, 4,5,6
5.3.	Tukey multiple range test	2	CO3, 4,5,6
Unit 6.	**Correlation**	**4**	
6.1.	Pearson correlation	2	CO3, 4,5,6
6.2.	Spearman correlation	2	CO3, 4,5,6
Unit 7.	**Regression**	**4**	
7.1.	Linear regression	2	CO3, 4,5,6
7.2.	Non-linear regression	2	CO3, 4,5,6

8. Teaching methods:

Students have to do the following duties:

- Lecture (theory)
- Computer Lab and take home exercises

9. Duties of student:

Students have to do the following duties:

- Hand-out
- Reading the books listed in references

10. Assessment of course learning outcomes:

10.1. Assessment

No.	Point components	Rules and Requirements	Weights	COs
1	Lab. Exam	Math and Computer skill SPSS and excel)	40%	CO3-6
2	Midterm Exam	Theory of the definition of statistics and experiment setting up	20%	CO1,2,3,4
3	Final Exam	Getting the knowledge about the aquaculture statistics to analyze the data of set up experiments and to interpret the results for scientific writing	40%	CO5,6

10.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Course score is the sum of all the components of the evaluation multiplied by the corresponding weight. The course score is marked on a scale of 10 and rounded to one decimal place, then it is converted to score on a scale of 4 under the academic regulations of the University.

11. Learning materials:

Learning materials information	Barcode number
[1] Vo Nam Son, Do Thị Thanh Huong and Nguyen Thanh Phuong, 2015. Applied statistics in Aquaculture. Can Tho University Publication, 180p.	639.015195 – S464 TS005469
[2] Ram C. Bhujel, 2009. Statistics for aquaculture. Willey-BlackWell, A John Willey and Sons publications 240p	639.8072'7-SH135.B48 TS005473
[3] George W. S. and W. G. Cochran, 1989. Statistics methods. Iowa State University Press. Ames, Iowa 50010. 503p	519.5-S671 TS001098

12. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Student's Tasks
1	**Chapter 1. Probability Distributions** 1.1. Probability, probability distribution, Binomial distribution and Poisson distribution 1.2. Normal probability distribution	**6**	3	Read [2]: page: 42-49; Read [3] page: 17-62; 117-130
2	**Chapter 1. Probability Distributions (cont.)** 1.3. Sampling distribution of means 1.4. Student's t distribution 1.5. Chi square distribution 1.6. Fisher distribution	6	3	Read [2]: page: 42-49; Read [3] page: 17-62; 117-130
3	**Chapter 2. Population and sample** 2.1. Types of data 2.2. Methods of data collection 2.3. Descriptive of statistics	**4**	2	Read [1]: Page 1-3 Read [2]: page: 55-70; Read [3] page: 17-62;
4	**Chapter 3. Hypothesis Tests** 3.1. One-sample hypothesis 3.2. Two-sample hypothesis 3.3. Paired-sample hypothesis	**8**	4	Read [1]: Page 28-63; 91-105 Read [3] page: 64-80;
5	**Chapter 4. Single-factor Experiments** 4.1. Analysis of variance (1-Way ANOVA) 4.2. Completely randomized design (CRD)	**6**	3	Read [1]: Page 65-86 Read [2]: page: 99-131; Read [3] page: 83-95;

6	4.3. Randomized completely block design (RCB) 4.4. Latin square design (LS)	6	3	Read [1]: Page 65-86 Read [2]: page: 99-131; Read [3] page: 83-95;
7	**Chapter 5. Two-factor Experiments** 5.1. Complete block design 5.2. Two-way ANOVA	**6**	3	Read [3] page: 83-95; 196-212; 297-329
8	**Chapter 6. Comparison Between Treatment Means** 6.1. Least significant difference test (LSD) 6.2. Duncan's multiple range test 6.3. Tukey multiple range test	**6**	3	Read [1]: 28-34; Read [3] page: 83-95;
9	**Chapter 7. Correlation** 7.1. Pearson correlation 7.2. Spearman correlation	**6**	3	Read [1]: Page 1-3106-115 Read [2]: Page 135-161 Read [3] page: 177-193; 398-415
10	**Chapter 8. Regression** 8.1. Linear regression 8.2. Non-linear regression	**6**	3	Read [1]: Page 134-144 Read [2]: Page 135-161 Read [3] page: 83-95;

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ON BEHALF OF RECTOR
DEAN OF COLLEGE

BỘ GIÁO DỤC VÀ ĐÀO TẠO
TRƯỜNG ĐẠI HỌC CẦN THƠ

Vũ Ngọc Út

HEAD OF DEPARTMENT

Lê Quốc Việt