



Section 2 Course Goals and Course Description

1. Course Goals

Students will be able to demonstrate understanding and skills in analyzing data by descriptive and inferential statistical methods. Students will learn the statistical foundation for subsequent courses and experience various statistical knowledge for their future careers.

2. Course Description

(In Thai) แนวคิดความน่าจะเป็นและการแจกแจงความน่าจะเป็นและการประยุกต์กับเหตุการณ์หลากหลาย การตีความค่าสถิติ สถิติพรรณนา การชักตัวอย่างเพื่อให้ได้ตัวแทนที่ดีของประชากรและการนำไปใช้ในการประมาณค่าและการทดสอบสมมุติฐาน การนำเสนอบทความหรืองานวิจัยที่ตีพิมพ์ตามความสนใจของกลุ่มนักศึกษาโดยวิธีเชิงสถิติ

(In English) Concepts and applications of probability and probability distributions in various events; interpretation of statistical values; descriptive statistics; sampling for good representatives of populations and its use in estimation and hypothesis testing; presentation of article or published re-search according to groups of student's interest by statistical methods

Section 3 Course Objectives, Course-level Learning Outcomes and Course Implementation

1. Course Objectives

Instructor expects students to acquire skills and knowledge as follows. Students should:

1. Explain probability and basic statistics concepts.
2. Choose appropriate estimation and hypothesis testing for a given data set using inferential statistics.

2. Course-level Learning Outcomes: CLOs

On completion of the course, the students will be able to

1. CLO1 Explain fundamental concepts of probability, descriptive statistics, and statistical analysis.
2. CLO2 Compute probability of events, probability distributions and confidence interval.
3. CLO3 Choose an appropriate sampling method to represent population.
4. CLO4 Select a suitable estimation and hypothesis testing for a given set of data.



Program B.Sc. Bioinnovation
Course Title Statistics
Course Code SCMA 192

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Faculty of Science
Department of Mathematics

3. How to organize learning experiences to develop the knowledge or skills stated in number 2 and how to measure the learning outcomes

CLOs	Teaching and learning experience management			Learning outcomes measurements		
	Interactive lecture	Problem-based activities	Discussion	Assignments	Exams	Quizzes
CLO1	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓
CLO3	✓	✓	✓	✓	✓	✓
CLO4	✓	✓	✓	✓	✓	✓



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Section 4 Lesson Plan and Evaluation

1. Lesson Plan

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Instructor
		Theory	Practice		
1	Probability (I)	3	0	Interactive Lecture, Problem-based Activities, Discussion	Asst. Prof. Dr. Ruth J. Skulkhu
2	Probability (II)	3	0		
3	Random variables (I)	3	0		
4	Random variables (II)	3	0		
5	Discrete distributions (I)	3	0		
6	Discrete distributions (II)	3	0		
7	Continuous distributions	3	0		
8	Descriptive statistics	3	0		
9	Mid-term examination				
10	Sampling t-, Chi-Square, and F-Distributions Sampling Distribution and Estimation	3	0	Interactive Lecture, Problem-based Activities, Discussion	Asst. Prof. Dr. Ruth J. Skulkhu
11	Confidence intervals (I)	3	0		
12	Confidence intervals (II)	3	0		
13	Hypothesis testing (I)	3	0		
14	Hypothesis testing (II)	3	0		
15	Project Presentation (I)	3	0		
16	Project Presentation (II)	3	0		
17	Final Examination				
	Total hours of the entire semester	45	0		



2. Plan for Assessment of Expected Course-Level Learning Outcomes (CLOs)

2.1 Measurement and Evaluation of learning achievement

A. Formative Assessment

During a lesson, the instructor keeps the question going and monitors students' progress in general. There are also quick quizzes to check the current understanding of individual students.

B. Summative Assessment

(1) Tool and weight for measurement and evaluation

Learning Outcomes	Evaluation Method		Weight (Percentage)
	Assignments	Exams	
CLO1 Explain fundamental concepts of probability, descriptive statistics, and statistical analysis.	4	16	20
CLO2 Compute probability of events, probability distributions and confidence interval.	4	16	20
CLO3 Choose an appropriate sampling method to represent population.	4	16	20
CLO4 Select a suitable estimation and hypothesis testing for a given set of data.	8	32	40
Total	20	80	100

(2) Grading Rules

After completion of the evaluation process each student is assigned a criterion-referenced grade (as shown in the table below). Evaluation and achievement will be justified according to Faculty and University code, conducted by grading system of A, B+, B, C+, C, D+, D and F.

Total percentage of evaluation	Grade
80 - 100	A
74 - 79	B+
68 - 73	B
60 - 67	C+
52 - 59	C
46 - 51	D+
40 - 45	D
0 - 39	F



(3) Measurement and Evaluation

To pass this course, students must earn a grade of at least D.

2.2 Re-examination (if the course allows any.)

None.

3. Students' Appeal

Students may submit academic appeal directly to
International Education and Administration Unit, Division of Salaya Campus
Room SC1-116, SC1-Building, Faculty of Science (Salaya Campus), Mahidol University
999 Phuttamonthon 4 Road, A. Phuttamonthon, Nakhon Pathom 73170, Thailand
E-mail: scsim@mahidol.ac.th; Phone: + 66 2 4419820 ext. 1199.

Section 5 Teaching Resources

1. Required Texts

- 1) Walpole, R.E. et al. **Probability & Statistics for Engineers & Scientists**, 9th ed., Pearson Prentice Hall, NJ, USA; 2016.
- 2) Weiss, N.A., **Introductory Statistics**, 10th ed., Addison-Wesley; 2015.
- 3) Bluman, A.G. **Elementary Statistics (A step by step approach)**, 5th ed., McGraw-Hill; 2004.
- 4) Spiegel, M.R. **Schaum's outlines of Probability and Statistics**, 4th ed., McGraw-Hill; 2013.
- 5) De Veaux, R. **Stats: Data and Models**, 5th ed., Pearson 2019.

2. Suggested Materials

- 1) Johnson, R.A., **Statistics: principles and methods**, 8th ed., John Wiley & Sons; 2019.
- 2) Hogg, R.V., **Probability and statistical inference**, 5th ed., Prentice-Hall; 1997.
- 3) Mendenhall, W., **Probability and statistics**, 15th ed., Cengage Learning; 2019.

3. Other Resources (if any)

- 1) [khanacademy.org](https://www.khanacademy.org)



Section 6 Evaluation and Improvement of Course Implementation

1. Analysis and Evaluation of Course Implementation

A. Data for Analysis

Evaluation of instructor and course through Mahidol University E-Evaluation System.

B. Course Effectiveness Evaluation

Evaluation of instructor and course through Mahidol University E-Evaluation System and students' performance.

2. Revision Process and Improvement Plan for Course Effectiveness

Course responsible faculty member and instructors review course effectiveness in achieving course learning outcomes using outputs from course and instructor evaluation (Mahidol University E-Evaluation System), student evaluation to determine further improvement plan, and formal complaint or academic appeal (if any) to determine further improvement plan.

3. The self-assessment report of the course

Create a course report MU5 to identify areas for improvement for the next academic year.



Appendix

1. Relations between the course and the program

Table 1 Relations between the course and the PLOs

Course Title.....	Program-Level Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO..	PLO..
(Course Code)								

Table 2 Relation between CLOs and PLOs

(Course Code)	Program-Level Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO..	PLO..
CLO1								
CLO2								
CLO3								
CLO								
CLO								

Table 3 PLOs and SubPLOs that the course is responsible for

PLOs	SubPLOs
PLO..	

2. Rubric scoring*



3. Relations between the course and Sustainable Development Goals (SDGs)

- | | | |
|-------------------------------------|-------|--|
| <input type="checkbox"/> | SDG1 | No poverty |
| <input checked="" type="checkbox"/> | SDG2 | Zero Hunger |
| <input checked="" type="checkbox"/> | SDG3 | Good Health and Well – being |
| <input type="checkbox"/> | SDG4 | Quality Education |
| <input type="checkbox"/> | SDG5 | Gender Equality |
| <input type="checkbox"/> | SDG6 | Clean Water and Sanitation |
| <input type="checkbox"/> | SDG7 | Affordable and Clean Energy |
| <input checked="" type="checkbox"/> | SDG8 | Decent Work and Economic Growth |
| <input checked="" type="checkbox"/> | SDG9 | Industry, Innovation, and Infrastructure |
| <input type="checkbox"/> | SDG10 | Reduced Inequalities |
| <input type="checkbox"/> | SDG11 | Sustainable Cities and Communities |
| <input checked="" type="checkbox"/> | SDG12 | Responsible Consumption and Production |
| <input type="checkbox"/> | SDG13 | Climate Action |
| <input type="checkbox"/> | SDG14 | Life Below Water |
| <input type="checkbox"/> | SDG15 | Life on Land |
| <input type="checkbox"/> | SDG16 | Peace, Justice, and Strong Institutions |
| <input type="checkbox"/> | SDG17 | Partnerships for the goals |