



TQF 3 Course Specifications

Section 1 General Information

1. Course code and course title

Thai ICMA 151 สถิติสำหรับวิทยาศาสตร์ ๑

English ICMA 151 Statistics for Science I

2. Number of credits 4 (4-0-8)

3. Program and type of subject

3.1 Program Undergraduate Degree (International Program)

3.2 Type of Subject Mathematics

4. Course Coordinator and Course Lecturer

4.1 Course Coordinator Asst. Prof. Jiraphan Suntornchost (JS)

4.2 Course Lecturer Asst. Prof. Chatchawan Panraksa (CP)

5. Trimester/ Year of Study

5.1 Trimester All trimesters/first year

5.2 Course Capacity Approximately 30 students

6. Pre-requisite N/A

7. Co-requisites N/A

Section 2 Goals and Objectives

1. Course Goals

Equip students with well-rounded data literacy by combining statistical methods with meaningful real-life activities.

2. Objectives of Course Development/Revision

2.1 Course Objectives

1. To organize, present and interpret statistical data, both numerically and graphically,
2. To use various methods to compute the probabilities of events,
3. To analyze and interpret statistical data using appropriate probability distributions, e.g. binomial and normal,
4. To apply central limit theorem to describe inferences,



5. To construct and interpret confidence intervals to estimate means, standard deviations and proportions for populations,
6. To perform parameter testing techniques, including single and multi-sample tests for means, standard deviations and proportions, and
7. To perform a regression analysis, and compute and interpret the coefficient of correlation.

2.2 Course-level Learning Outcomes: CLOs

By the end of the course, students will be able to (CLOs)

1. CLO 1: Identify basic statistical methods related to making decisions.
2. CLO 2: Deliver a logical solution to statistical problems that one could encounter in life science by extending on his/her statistical understanding of the problem.
3. CLO 3: Judge efficiency of decision-making processes.
4. CLO 4: Execute statistical decisions with the awareness of real world situation.
5. CLO 5: Work effectively in a team with members.
6. CLO 6: Realize impacts of statistical decision making toward self, society, and the world.

Section 3 Course Management

1. Course Description

ความคิดเห็นและแนวคิดทางสถิติ ความน่าจะเป็น และการแจกแจง ฟังก์ชันการแจกแจงค่าคาดหวัง การประมาณค่าแบบจุดและแบบช่วง การทดสอบสมมุติฐาน

Statistical ideas and concepts; probability and conditional probability; distribution functions; expected value; estimators; good estimators and hypothesis testing

2. Credit hours per trimester

Lecture (Hour(s))	Laboratory/field trip/internship (Hour(s))	Self-study (Hour(s))
48	0	0

3. Number of hours that the lecturer provides individual counseling and guidance.

1 hour/week



Section 4 Development of Students' Learning Outcome

1. Short summary on the knowledge or skills that the course intends to develop in students (CLOs)

By the end of the course, students will be able to

1. CLO 1: Identify basic statistical methods related to making decisions.
2. CLO 2: Deliver a logical solution to statistical problems that one could encounter in life science by extending on his/her statistical understanding of the problem.
3. CLO 3: Judge efficiency of decision-making processes.
4. CLO 4: Execute statistical decisions with the awareness of real world situation.
5. CLO 5: Work effectively in a team with members.
6. CLO 6: Realize impacts of statistical decision making toward self, society, and the world.

2. Teaching methods for developing the knowledge or skills specified in item 1 and evaluation methods of the course learning outcomes

Course Code	Teaching methods	Evaluation Methods
CLO1	Lecture/discussion	Quizzes
CLO2	Lecture/discussion	Quizzes
CLO3	Lecture/discussion	Quizzes
CLO4	Lecture/discussion	Quizzes
CLO5	Lecture/discussion	Quizzes
CLO6	Lecture/discussion	Quizzes

Section 5 Teaching and Evaluation Plans

1. Teaching plan

Week	Topic	Number of Hours		Teaching Activities/ Media	Lecturer
		Lecture Hours	Lab/Field Trip/Internship Hours		
1	Introduction to statistics	4	0	Lecture and Discussion/Whiteboard and Visualizer	CHP
2	Probability	4	0	Lecture and Discussion/Whiteboard and Visualizer	



3	Discrete random variables	4	0	Lecture and Discussion/Whiteboard and Visualizer
4	Continuous random variables	4	0	Lecture and Discussion/Whiteboard and Visualizer
5	Sampling distribution and Central Limit Theorem	4	0	Lecture and Discussion/Whiteboard and Visualizer
6	Estimation	4	0	Lecture and Discussion/Whiteboard and Visualizer
	Midterm Exam			
7	Point estimators and methods of estimation	4	0	Lecture and Discussion/Whiteboard and Visualizer
8	Hypothesis testing I	4	0	Lecture and Discussion/Whiteboard and Visualizer
9	Hypothesis testing II	4	0	Lecture and Discussion/Whiteboard and Visualizer
10	Linear model, least squares	4	0	Lecture and Discussion/Whiteboard and Visualizer
11	Linear regression	4	0	Lecture and Discussion/Whiteboard and Visualizer
12	Analysis of variance (ANOVA)	4	0	Lecture and Discussion/Whiteboard and Visualizer
	Final Exam			
Total		48	0	

2. Plan for Assessing Course Learning Outcomes

2.1 Assessing and Evaluating Learning Achievement

a. Formative Assessment (20%)

Quizzes: Quizzes will be given every two or three sections in each chapter to formally assess students' progress and provide feedback to enhance learning. Students will be able to use completed homework for those sections on the assessment. Cell phones and iPads need to be put away under the student's desk.



Homework: Homework will be given nightly and due the next class period. Students are expected to complete the assignments with legitimate effort by showing sufficient work.

b. Summative Assessment (80%)

Unit Assessments, Projects, and Exams (80%): On assessments, projects, and exams, partial credit will be awarded for any work done correctly. All formative assessments need to be completed prior to taking the test.

(1) Tools and Percentage Weight in Assessment and Evaluation

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)	
CLO1 Identify basic statistical methods related to making decisions.	Quizzes, Writing Examination	20	20%
CLO2 Deliver a logical solution to statistical problems that one could encounter in life science by extending on his/her statistical understanding of the problem.	Quizzes, Writing Examination	20	20%
CLO3 Judge efficiency of decision making processes.	Quizzes, Writing Examination	20	20%
CLO4 Execute statistical decisions with the awareness of real world situation.	Quizzes, Writing Examination	20	20%
CLO5 Work effectively in a team with members.	Quizzes, Writing Examination	10	10%
CLO6 Realize impacts of statistical decision-making toward self, society, and the world.	Quizzes, Writing Examination	10	10%
Total		100	100%



(2) Grading System

Grade	Achievement	Final Score (% range)	GPA
A	Excellent	90-100	4.0
B+	Very good	85-89	3.5
B	Good	80-84	3.0
C+	Fairly good	75-79	2.5
C	Fair	70-74	2.0
D+	Poor	65-69	1.5
D	Very poor	60-64	1.0
F	Fail	Less than 60	0.0

(3) Re-examination (If course lecturer allows to have re-examination)

N/A - (Not applicable with MUIC)

3. Student Appeals

Students can appeal by submitting a form to the Office of Academic Affairs.

Section 6 Teaching Materials and Resources

1. Main texts and documents (Required Texts)

1) Wackerly, D.D., Mendenhall III, W., Scheaffer, R.L. Mathematical statistics with applications. 7th Edition. USA. Duxbury, 2008.

2. Recommended documents and information (Suggested Materials)

As posted on the course's e-learning site

3. Other Resources (If any)

As posted on the course's e-learning site

Section 7 Evaluation and Improvement of Course Management

1. Strategies for evaluating course effectiveness by students



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- 1.1 Student evaluation of own performance (online)
 - 1.2 Student evaluation of course quality (online)
 - (1) Course content
 - (2) Course management
 - (3) Suggestions
 - (4) Overall opinion
 - 1.3 Faculty or supervisor evaluation of course quality
 - (1) Course content
 - (2) Course management
 - (3) Suggestions
 - (4) Overall opinion
 2. Strategies for evaluating teaching methods
 - 2.1 Student evaluation
 - 2.2 Faculty or supervisor evaluation
 3. Improvement of teaching methods
 - 3.1 Meetings between lecturer, peers, and supervisor
 - 3.2 Being evaluated from peers
 - 3.3 Attending teaching and learning workshops, seminars, and conferences
 - 3.4 Obtaining new pedagogy information from trustable online resources
 4. Verification process for evaluating students' standard achievement outcomes in the course
Analysis of students' learning outcomes using scores from class attendance, assignments, and examinations
 5. Review and plan for improving the effectiveness of the course
Regular communication between lecturers, peers, and supervisor to review the course throughout the year as needed.



Appendix
Alignment between Courses and Program

Table 1 The relationship between course and Program Learning Outcomes (PLOs)
It depends on each program’s learning outcomes.

Statistics for Science I	Program Learning Outcomes (PLOs)						
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO 7
ICMA 151	I	I				I	I

Note: Indicate the level of CLOs by letter I, R, P or M. Using the information as shown in the Curriculum Mapping of TQF2

Table 2 The relationship between CLOs and PLOs
It depends on each program’s learning outcomes. (Number in table = Sub LOs)

ICMA151	Program Learning Outcomes (PLOs)						
	PLO 1	PLO 2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1 Identify basic statistical methods related to making decisions.	1.1,1.2						
CLO2 Deliver a logical solution to statistical problems that one could encounter in life science by extending on his/her statistical understanding of the problem.		2.1	3.1				



CLO3 Judge efficiency of decision making processes.							7.1
CLO4 Execute statistical decisions with the awareness of real world situation.				4.1,4.2			
CLO5 Work effectively in a team with members.					5.1		
CLO6 Realize impacts of statistical decision making toward self, society, and the world.						6.1	

Table 3 The description of PLOs and Sub Los of the course

It depends on each program’s learning outcomes.

PLOs	SubPLOs
PLO1 Acquire the basic skills and conceptual understanding regarding differential, integral and multivariable calculus, as well as that of fundamental mathematical objects introduced in our core courses such as sets, functions, equations, vectors, matrices, and groups	1.1 Recognize and describe what hypothesis testing is required for a given set of data 1.2 Apply appropriate statistical tests to data
PLO2 Use knowledge of content and mathematical procedures to solve problems and make connections between the different areas of mathematics	2.1 Apply concepts of statistics to solving application problems
PLO3 Demonstrate intellectual curiosity and a strong propensity towards independent learning	3.1 Demonstrate the analytical, communication, problem solving, interpersonal, and technical skills that will provide a strong foundation for scientific



	productivity and progressive career development.
PLO4 Demonstrate mathematical thinking skills, progressing from a procedural and computational understanding of mathematics to logical reasoning, pattern recognition, generalization, and abstraction, and to a formal proof	<p>4.1 Demonstrate ability to think like a scientist: critical-thinking and problem-solving, quality of the thinking</p> <p>4.2 Demonstrate the ability to perform various tests of hypothesis</p>
PLO5 Apply concepts of scientific integrity and commit to professional ethics and responsibilities and norms of the profession	5.1 Demonstrating abilities to maintain an unbiased review and approaching the process for its value, expanding science knowledge
PLO6 Communicate mathematical ideas orally and in writing, with precision, clarity and organization, using proper terminology and notation	6.1 Communicate/present ideas effectively both oral & written forms, proper to audience groups
PLO7 Acquire proficiency in the use of technology and numerical techniques to assist in learning and investigating mathematical ideas and in problem-solving	7.1 Describe process of transposing of data into computer-based information