Bachelor of Science Program
Undergraduate

Department of Applied Statistics
Faculty of Applied Science

**Course Code 040503011 Statistics for Engineers and Scientists**

**Name of Institution** King Mongkut's University of Technology North Bangkok

**Campus/Faculty/Dept/Division** Bangkok/Applied Science/Applied Statistics/Applied Statistics

## Section 1: General Information

1. **Course code and course title**

   040503011 Statistics for Engineers and Scientists

2. **Total credits**

   3 credits (3-0-6)

3. **Curriculum and course category:**

   Curriculum: Bachelor of Engineering Program in Industrial Electrical and Energy Engineering

   Course category: Specific course

4. **Course coordinator/ Instructors**

   Assoc. Prof. Dr. Orathai Polsen (ORP) and Asst. Prof. Dr. Jeerapa Sappakitkamjorn (JSJ)

5. **Semester/ year of study**

   1/2025

6. **Pre-requisite (if any)**

   None

7. **Co-requisites (if any)**

   None

8. **Venue of study**

   Faculty of Business and Industrial Development, KMUTNB

9. **Information for quality assurance in education**

   This course shows evidence of:

   ☑ Development of implementation from previous practices, e.g. the improvement of class teaching, course content, content classification and methods used for learning assessment

   ☐ Involvement from professional bodies/ external agencies in instruction; thus enhancing student academic and professional experiences

☐ Integration of research or creative activities with instruction; use of research-based learning management; knowledge management practices for learning improvement

☐ Integration of academic services and course implementation

☐ Combination of cultural heritage preservation efforts into instruction or student activities

**10. Date of latest revision:**

June 16, 2025

## Section 2: Course Description and Implementation

**1. Course Description**

Overview statistics, sample space and probability, random variables, probability function of random variable, expectation and variance, some probability distribution of discrete and continuous random variables, Z-distribution, t-distribution, $\chi^2$-distribution and F-distribution, estimations and tests of hypothesis on mean, variance and proportion in case of one population and two populations, one-way analysis of variance, simple linear correlation and regression analysis.

**2. Number of hours per semester**

| Lecture | Practice | Self-study |
|---|---|---|
| 45 hours/semester<br>(3 hours/week) | --- | 90 hours/semester<br>(6 hours/week) |

**Course Category** ☑ Lecture ☐ Practice

**Course Evaluation** ☑ A-F ☐ S/U ☐ P

**3. Number of hours per week for academic guidance to individual students**

1. Giving academic advice (minimally 6 hours per week)
2. Giving academic advice through the email and Google Classroom

**4. Course Learning Outcomes (CLOs): Students should be able to:**

CLO 1. Explain the statistical process for organizing and analyzing data

CLO 2. Understanding of statistical tools to analyze data

CLO 3. Analyze statistical data and interpret the results accurately

CLO 4. Apply statistical tools appropriately

CLO 5. Apply statistical program for selected statistical tools appropriately

5. The mapping between Expected Learning Outcomes (ELOs) from the curriculum and Course Learning Outcomes (CLOs)

Table 5.1 Mapping desirable characteristics of KMUTNB graduates and CLOs (for non-specific courses designed for various curriculums)

| Consistency between desirable characteristics of KMUTNB Graduates- CLOs | CLO 1 | CLO 2 | CLO 3 | CLO 4 | CLO 5 |
|---|---|---|---|---|---|
| 1. Professional Credentials with Critical Thinking Skills | | ✓ | | ✓ | ✓ |
| 2. Integrity and Social Responsibility | ✓ | | ✓ | | |
| 3. Innovative and Technopreneur Mindset | | | | | |
| 4. Global Competence | | | | | |

Section 3: Student Improvement in relation to Course Learning Outcomes (CLOs)

Organizing learning to develop skills/ knowledge; evaluation of CLOs in accordance with the ones identified in Section 2.4

| Course Learning Outcomes (CLOs) | Teaching Methods compliant with CLOs | Evaluation Methods compliant with CLOs |
|---|---|---|
| CLO 1 | Lecture with examples using PowerPoint, assignment | - Midterm examination<br>- Assignment evaluation |
| CLO 2 | Lecture with examples using PowerPoint, assignment | - Midterm examination<br>- Assignment evaluation |
| CLO 3 | Lecture with examples using PowerPoint, assignment | - Midterm and final examinations<br>- Assignment evaluation |
| CLO 4 | Lecture with examples using PowerPoint, case studies, assignment | - Final examination<br>- Assignment evaluation |
| CLO 5 | Lecture with examples of the using of statistical program for analyzing data, assignment | - Assignment evaluation |

## Section 4: Lesson Plan and Evaluation

### 1. Lesson Plan

| Week | Topics/Details | CLOs | Hours | Learning and teaching activities; teaching media (if any) | Lecturer |
|---|---|---|---|---|---|
| 1 | Introduction to statistics | 1, 2 | 3 | Lecture/Examples | ORP and JSJ |
| 2 | Introduction to statistics (continued) | 1, 2 | 3 | Lecture/Examples | |
| 3 | Probability | 2, 3 | 3 | Lecture/Examples | |
| 4 | Probability (continued) | 2, 3 | 3 | Lecture/Examples | |
| 5 | Random variable | 2, 3 | 3 | Lecture/Examples | |
| 6 | Discrete probability distributions | 2, 3 | 3 | Lecture/Examples | |
| 7 | Discrete probability distributions (continued) | 2, 3 | 3 | Lecture/Examples | |
| 8 | Continuous probability distributions | 2, 3 | 3 | Lecture/Examples/ Hand in Assignment I | |
| 9 | Midterm examination | | | | |
| 10 | Sampling distributions | 2 | 3 | Lecture/Examples | |
| 11 | Estimations | 2, 3, 4 | 3 | Lecture/Examples | |
| 12 | Tests of hypothesis | 2, 3, 4 | 3 | Lecture/Examples | |
| 13 | Tests of hypothesis (continued) | 2, 3, 4 | 3 | Lecture/Examples | |
| 14 | Analysis of variance | 2, 3, 4, 5 | 3 | Lecture/Examples | |
| 15 | Simple linear regression | 2, 3, 4, 5 | 3 | Lecture/Examples | |
| 16 | Correlation | 2, 3, 4, 5 | 3 | Lecture/Examples/ Hand in Assignment II | |
| 17 | Final examination | | | | |
| | | Total | 45 | | |

**2. Evaluation Plan (in accordance with OBE 2 mapping framework)**

| Course Learning Outcomes (CLOs) | Evaluation Methods | Week of Evaluation | Percentage of Evaluation |
|---|---|---|---|
| CLO 1, 2, 3 | Midterm examination | 9 | 35% |
| CLO 2, 3, 4 | Final examination | 17 | 50% |
| CLO 1, 2, 3, 4, 5 | Assignments | 8, 16 | 10% |
| CLO 1, 2, 3, 4 | Class participation | 1-8, 10-16 | 5% |

## Section 5 Teaching/Learning Resources

**Main material**

Polsen, O. (2025). *Lecture Notes in Statistics for Engineers and Scientists*. Department of Applied Statistics, Faculty of Applied Science, King Mongkut's University of Technology North Bangkok.

Sappakitkamjorn, J. (2025). *Lecture Notes in Statistics for Engineers and Scientists*. Department of Applied Statistics, Faculty of Applied Science, King Mongkut's University of Technology North Bangkok.

**Textbooks**

Devore, J. L. (2015). *Probability and Statistics for Engineering and the Sciences*. 9th ed., Cengage Learning.

Illowsky, B. and Dean, S. (2018). *Introductory Statistics*. Rice University. Retrieved from https://openstax.org/details/books/introductory-statistics.

Scheaffer, R. L., Mulekar, M., and McClave, J. T. (2010). *Probability and Statistics for Engineers*. 5th ed., Duxbury Press.

Walpole, R. E., Myers, R. H., Myers, S. L., and Ye, K. (2011). *Probability & Statistics for Engineers & Scientists*. 9th ed., Pearson.

Weiss, N. A. (2015). *Introductory Statistics*. 10th ed., Pearson.

## Section 6 Course Evaluation and Improvement

1. **Course evaluation by students**
   - ☑ Course evaluation form
   - ☐ Group discussions, collaborative exchange of ideas among a teacher and students
   - ☑ Behavior reflections
   - ☐ Online suggestion, a communication channel set up by instructors
   - ☐ Other (specify).....
2. **Strategies for assessing learning management**
   - ☑ Assessment form to evaluate instructors
   - ☑ Exam results
   - ☐ Review/ verification of student academic performance and learning outcomes
   - ☑ Assessment by the Examination Committee
   - ☐ Observation by teaching team members
   - ☐ Other (specify).....
3. **Improvement schemes of course implementation**
   - ☑ Seminars and workshops on teaching and learning
   - ☐ Conducting research on learning pragmatics, both inside and outside classroom contexts
   - ☐ Other (specify).....
4. **Verification of students' learning outcomes, referred to OBE 2 and 3**
   - ☑ Setting up a committee to inspect results of learning outcomes assessment, e.g. investigation of examination, grading and performance appraisal
   - ☐ Review of scoring and evaluation by the Faculty/ Department academic committee
   - ☐ Grading verification by random check from faculty members/ experts who are not in Charge of the curriculum
   - ☐ Other (specify).....
5. Course review and improvement plans
   - ☑ Annual course revision along with the reviewer suggestions in item 4
   - ☐ Annual course revision in consideration of student assessment and comments
   - ☑ Other (specify) Updating course content every 5 years