Course Title: **Statistics I**

Lecturer: Tomohiro Uchiyama

Lecture time: Tuesday 13:05-14:35 & Thursday 13:05-14:35  
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Course Description:

An introduction to the ideas, techniques and applications of statistics and probability.

An introduction to the ideas, techniques, and applications of statistics and probability. The emphasis is on applying statistics to problems, selecting sensible techniques, following the methodology and interpreting the results. Understanding the concepts and computer-based solutions are emphasised and applications to commerce, social sciences, humanities, science and engineering are considered. Particular topics include data analysis, summary statistics, probability, statistical distributions, estimations, and inferences (including confidence intervals, hypothesis tests and modelling).

Learning Outcomes:

A student who successfully completes this course will:

- understand a range of basic statistical concepts in
  - data analysis: uncertainty, variation, summary statistics;  
  - probability: meaning of probability, sets, events, and distributions;  
  - estimation: samples, populations, parameters, estimates, and uncertainty;  
  - inference: hypotheses, tests, test statistics, test interpretations.

- perform and interpret a range of basic statistical procedures in
  - data analysis: summary statistics and graphics;  
  - probability: calculations and identification/application of distributions;  
  - estimation: estimation of parameters and confidence intervals;  
  - inference: hypothesis tests and model building.

- use Excel and R in performing statistical calculations and producing diagrams;

- identify applications of statistics in other university subjects.
Textbooks:
The text for this course is: Mendenhall, Beaver, Beaver, Introduction to probability and statistics, Cengage Learning.

Assessment:

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<tr>
<th>Assessment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Quizzes (weekly)</td>
<td>60%</td>
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<tr>
<td>Final Examination</td>
<td>40%</td>
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Course Outline:

Week 1. Statistics:
What is Statistics? The language of statistics, Variables, Data collections, Samples, Statistics and technology.

Week 2. Descriptive analysis 1 (single variable data):
Graph, Mean, Median, Mode, Variance and Standard deviation.

Week 3. Descriptive analysis 2 (single variable data):
Quartile, Percentile, Boxplot, Statistical deception.

Week 4. Descriptive analysis 3 (bivariate data):
Scatter diagram, Covariance, Correlation coefficient.

Week 5. Descriptive analysis 4 (bivariate data):
Line of good fit, Summary of Descriptive analysis.

Week 6. Discrete probability distributions:
Probability of discrete random variables, Mean and variance of probability, Binomial distributions.

Week 7. Standard normal distribution 1:
Standard normal distribution, Normal curve and Z-table.

Week 8. Standard normal distribution 2:
Normal approximation of a binomial distribution.

Week 9. Sampling distributions:
Sampling distributions, Central limit theorem, Applications of the sampling distributions.

Week 10. Estimation 1:
The nature of estimation, Estimation of a mean.

Week 11. Estimation 2:
The nature of hypothesis testing, hypothesis test of a mean.
Week 12. Statistical inferences 1:
Inferences about a mean, Inferences about the binomial probability of success.

Week 13. Statistical inferences 2:
Inferences about a variance and a standard deviation.

Week 14. Review:
Review and a preparatory test.

Week 15. Final Examination: