

## COURSE OUTLINE: MH1820

Course Title	<b>Introduction to Probability and Statistical Methods</b>		
Course Code	<b>MH1820</b>		
Offered	Study Year 1, Semester 2		
Course Coordinator	Ku Cheng Yeaw (Dr)	cyku@ntu.edu.sg	6513 8652
Pre-requisites	HE1004		
Mutually exclusive	MH2500, HE1005, MH1800, MH2814, MT2001, AB1202		
AU	3		
Contact hours	Lectures: 26, Tutorials: 12		
Approved for delivery from	AY 2022/23 semester 2		
Last revised	9 Dec 2022, 13:29		

### Course Aims

This course provides a good foundation in probability and statistical inference. Basic ideas and methodologies in probability and statistics which are useful for economics students are introduced. It also aims to prepare students for higher level applied and theoretical econometric courses.

### Intended Learning Outcomes

Upon successfully completing this course, you should be able to:

1. Analyse datasets and draw conclusions from them
2. Construct models underlying data generating processes and use the models for prediction
3. Draw inference about larger populations from which datasets are drawn
4. Make informed decisions based on data-based evidence.
5. Determine the functions, appropriateness, and theoretical assumptions of common methods of statistical analysis

### Course Content

Probability

Discrete Distributions

Continuous Distributions

Bivariate Distributions

Functions of Random Variables

Estimation

Conditional expectation and variance involving multiple random variables

Law of Large Numbers and the Central Limit Theorem

Hypotheses Testing

## Assessment

Component	Course ILOs tested	SPMS-MAS Graduate Attributes tested	Weighting	Team / Individual	Assessment Rubrics
<b>Continuous Assessment</b>					
<b>Tutorials</b>					
Assignment	1, 2, 3, 4, 5	1. a, b 2. a, d 3. a 4. a 5. a	20	individual	See Appendix for rubric
<b>Mid-semester Quiz</b>					
Short Answer Questions	1, 2, 3, 4, 5	1. a, b 2. a, d 3. a 4. a 5. a	20	individual	See Appendix for rubric
<b>Examination (2 hours)</b>					
Short Answer Questions	1, 2, 3, 4, 5	1. a, b 2. a, d 3. a 4. a 5. a	60	individual	See Appendix for rubric
<b>Total</b>			<b>100%</b>		

These are the relevant SPMS-MAS Graduate Attributes.

### 1. Competence

- a. Independently process and interpret mathematical theories and methodologies, and apply them to solve problems
- b. Formulate mathematical statements precisely using rigorous mathematical language

### 2. Creativity

- a. Critically assess the applicability of mathematical tools in the workplace
- d. Critically analyse data from a multitude of sources

### 3. Communication

- a. Present mathematics ideas logically and coherently at the appropriate level for the intended audience

### 4. Civic-mindedness

- a. Develop and communicate mathematical ideas and concepts relevant in everyday life for the benefits of society

### 5. Character

- a. Act in socially responsible and ethical ways in line with the societal expectations of a mathematics professional, particularly in relation to analysis of data, computer security, numerical computations and algorithms

## Formative Feedback

Feedback will be given after each midterm on common mistakes and level of difficulty of the problems. For the final exam, comments on answers and common errors will also be given to students after the exams are marked.

Feedback can also be given through discussion within tutorial lessons.

## Learning and Teaching Approach

<b>Lectures</b> (26 hours)	Help the students understand the motivation and definitions of the concepts and notions, approaches to solving the problems in pursuant to learning outcomes
<b>Tutorials</b> (12 hours)	Develop communication and presentation skills, help the students understand better the concepts and notions better and the techniques in problem solving

## Reading and References

Hogg, R.V., E.A. Tanis and D.L. Zimmerman  
Probability and Statistical Inference (2015, 9th Ed.), Pearson ISBN: 9780321923271

I. and M. Miller, John  
E. Freund's Mathematical Statistics with Applications (2014, 8th Ed.), Pearson  
Prentice-Hall ISBN: 978129202500

Walpole, Myers, Myers, Ye, Probability and Statistics for Engineers and Scientists, 9th Edition,  
Pearson. ISBN:9780321629111

## Course Policies and Student Responsibilities

### (1) General

Students are expected to complete all tutorial questions. Students are expected to take responsibility to follow up with course notes, tutorials and course related announcements if they are absent.

### (2) Absenteeism

Absence from tests and the final examination without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

### (3) Absence Due to Medical or Other Reasons

If you are sick and not able to attend the tests, you have to submit the original Medical Certificate (or another relevant document) to the administration to obtain official leave. In this case, the missed assessment component will not be counted towards the final grade. There are no make-up tests.

## Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [Academic Integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

## Course Instructors

Instructor	Office Location	Phone	Email
Ku Cheng Yeaw (Dr)	MAS-05-11	6513 8652	cyku@ntu.edu.sg

## Planned Weekly Schedule

Week	Topic	Course ILO	Readings/ Activities
1	Probability	1, 2	Lecture Notes
2	Probability	1, 2	Lecture Notes
3	Discrete Distributions	2, 3, 5	Lecture Notes
4	Discrete Distributions	2, 3, 5	Lecture Notes. Assignment 1
5	Continuous Distributions	2, 3, 5	Lecture Notes
6	Continuous Distributions	2, 3, 5	Lecture Notes
7	Bivariate Distributions	2, 3, 5	Lecture Notes
8	Bivariate Distributions	2, 3, 5	Lecture Notes, Mid-semester Quiz
9	Bivariate Distributions and conditional expectation and variance	2, 3, 5	Lecture Notes
10	Functions of Random Variables and Estimation	2, 3	Lecture Notes, Assignment 2
11	Law of large numbers and the Central Limit Theorem	3, 4, 5	Lecture Notes
12	Hypothesis Testing	3, 4, 5	Lecture Notes
13	Hypothesis Testing	3, 4, 5	Lecture Notes

## Appendix 1: Assessment Rubrics

### Rubric for Tutorials: Assignment (20%)

Point-based marking

### Rubric for Mid-semester Quiz: Short Answer Questions (20%)

Point-based marking

### Rubric for Examination: Short Answer Questions (60%)

Point-based marking