Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+

If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to <u>Data Transformation Status</u> for more information.

Expected Implementation in Academic Year	AY2024-2025	
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1 Semester 2	
Course Author * Faculty proposing/revising the course	Michele Nguyen	
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Course Title	STATISTICS & ANALYSIS	
Course Code	AB1202	
Academic Units	3	
Contact Hours	39	
Research Experience Components	Not Applicable	

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course introduces the concepts and methods of statistical inferences: the process of inferring unknowns based on collected data. Students of this course will also learn basic programming skills to conduct statistical analyses in the R environment.

This course consists of three main modules. Module 1 introduces elements of probability theory. Module 2 covers the method of statistical inferences. Module 3 introduces two applications of statistical inferences, linear regression and simulation analysis.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Relate the theory of statistical inferences to business applications
ILO 2	Run simulation and regression analyses
ILO 3	Use R to conduct statistical analysis and interpret the results

Course Content

Module 1: Elements of probability • Understand probability • Conditional probability and statistical independence • Random variables and probability distributions • Expectations Module 2: Statistical inferences • Sampling and sampling distribution • Confidence interval (CI) • Null hypothesis statistical testing Module 3: Simulation and Regression analysis • Regression analysis and variable coding • Conduct simulation analysis in the R environment

This course does not require a textbook. Below is a list of the recommended reference books. Students are encouraged to work thru the relevant exercises therein. You can find them from the course reserve and online library.

Key theory books:

- DeGroot MH, Schervish MJ (2012). Probability and statistics, 4th ed. Addison Wesley. ISBN-13: 978-0-321-50046-5.
- Law, A. M., Kelton, W. D., & Kelton, W. D. (2000). Simulation modeling and analysis. New York: McGraw-Hill.
- Wooldridge JM (2009). Introductory econometrics: a modern approach, 4th ed. South-Western Cengage Learning. ISBN: 978-0-324-58162-1. NTU Business Library. Call Number: HB139.W913i 2009. [e-book available from NTU Library]

Exercise books:

- Jaggia S, Kelly K (2019). Business Statistics Communicating with Numbers, 3rd ed. McGraw-Hill International. ISBN 13: 978-1-260-28837-7.
- Keller G (2014). Statistics for Management and Economics, 8th ed. Cengage. ISBN 13: 978-0-324-56949-0. NTU Business Library Call Number: HD30.215.K29 2008.
- Weiers RM (2008). Introduction to Business Statistics, 6th ed. South Western Cengage Learning. ISBN 13: 978-0-324-38143-6. NTU Business Library Call Number: HF1017.W418 2008.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Probability basics	ILO- 1	[Weiers]: 5.2,5.3 [Keller]: 6.1,6.2 [Jaggia]: 4.1 [DeGroot]1.3,1.4,1.6	In-person	
2	Conditional probabilities; statistical independence; random variables (RVs)	ILO- 1	[Weiers] 5.4,5.5,5.7 [Jaggia] 4.2 [DeGroot] 1.7,1.8,2.1,2.2	In-person	
3	Common discrete & continuous RVs	ILO- 1	[Weiers] 6,7 [Keller] 7,8 [Jaggia] 5,6 [DeGroot] 3.1,3.2	In-person	
4	Expected values	ILO- 1	Jaggia] 5.2,5.3 [DeGroot] 7.1	In-person	
5	Bivariate distributions and correlation	ILO- 1	[Keller] 7.2 [DeGroot] 3.4,3.6,4.6	In-person	
6	Sampling, descriptive statistics, & central limit theorem	ILO- 1, ILO- 3	[Weiers] 3,8.3 [Keller] 4.1,4.2,4.3, 9.1 [Jaggia] 3	In-person	
7	Confidence intervals	ILO- 1, ILO- 3	[Weiers] 9.4,9.5 [Keller] 10 [Jaggia] 8.1,8.2	In-person	Quiz 1
8	Hypothesis testing 1: Introduction & error probabilities	ILO- 1, ILO- 3	[Weiers] 10 [Keller] 11.1,11.2,12.1 [Jaggia] 9.1,9.2,9.3	In-person	
9	Hypothesis testing 2: applications	ILO- 1, ILO- 3	[Weiers] 10 [Keller] 11.1,11.2,12.1 [Jaggia] 9.1,9.2,9.3	In-person	

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
10	Regression analysis I	ILO- 2, ILO- 3	[Wooldridge] 2,3,6.2,7	In-person	
11	Regression analysis II	ILO- 2, ILO- 3	[Wooldridge] 2,3,6.2,7	In-person	
12	Simulation analysis	ILO- 2, ILO- 3	Class notes	In-person	
13	Revision. No class	-	-	In-person	Quiz 2

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Blende d learnin g design	The course follows the blended learning design, whereby students pick up the main concepts through online learning materials before the week's seminar. Students can assimilate the content at their own pace and are advised to repeat the online videos and exercises should they wish to. To maximize the learning outcome, students should properly review the e-learning materials and complete the accompanying exercises before each seminar.
Semina r	The seminar allows students to clear their queries interactively with their peers and the instructor.
	Since students may use Gen-AI tools in their personal learning, a guiding document is provided to help students discover the uses and limitations of such tools in the context of learning Statistics. These exercises include evaluating Gen-AI capabilities for probability computations, data generation and code debugging. Instructors may facilitate discussions on these topics during the seminars. Note that the use of Gen-AI is not examinable in this course and students will not be allowed to use Gen-AI during the quizzes.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Class Participation(Individual participation)	ILO1	С	10	Individual	Analytic	Relational
2	Continuous Assessment (CA): Test/Quiz(Computer Quizzes)	ILO2, ILO3	AK, PSDM	50	Individual	Analytic	Relational
3	Continuous Assessment (CA): Test/Quiz(E-Learning and online tests)	ILO2, ILO3	AK, PSDM	20	Individual	Analytic	Relational
4	Continuous Assessment (CA): Project(Group project)	ILO1	С	20	Team	Analytic	Extended Abstract

Description of Assessment Components (if applicable)

Explanations and course policies

1. Participation

Students are rated based on the frequency and quality of their interactions with their peers and instructor. "Quality" refers to opinions that are correct, thorough, and open up a productive path of inquiry (i.e., Wow!). To meaningfully participate in class discussions, come to your class prepared.

2. Quizzes

Students of this course will complete two (2) computer-based quizzes.

Date Coverage Weight Quiz 1 Sep. 27, Friday (6:30pm to 9:30pm) Weeks 1 to 5 20% Quiz 2 Nov. 15, Friday (6:30pm to 9:30pm) Weeks 6 to 12 30%

The quiz questions will be set based on lecture videos, online self-assessment exercises, and tutorial questions. Note that the use of Gen-AI tools and search engines will not be allowed during the quizzes. Further details will be released in due course.

3. E-learning component

For every teaching week, students should go to the main course website to (1) watch the lecture videos, and (2) complete/submit the e-learning exercises. These weekly learning activities should be completed by Sunday, 11pm, prior to the class.

Evaluation

To receive the full 20% of this component, students must (1) complete all weekly exercises before Sunday, 11pm, prior to the class, (2) obtain full marks for all weekly exercises.

• Late submissions

Students should complete the e-learning exercises of the week latest by 11:00pm on the Sunday of the seminar. That is, 11:00 pm on the Sunday before the week's class.

The completion status is recognized by the timestamps at which you complete all exercises on the NTULearn page. Please be reminded that there are multiple sets of exercises each week (under the same tab), typically one set after each video. Ensure you finish all exercises from the top to the bottom of the page. Incomplete submissions will be considered late as well. You can check the submission status of current and past exercises under "My Grades."

Penalty for late or incomplete submissions:

1 week of exercises = 2%

2 weeks of exercises = 5%

3 weeks of exercises = 9%

4 weeks of exercises =14%

5 weeks of exercises or more = 20% (i.e., zero marks for this component)

NOTE 1: The penalties for late or incomplete submissions kicks in once the deadline has passed. If a student's first submission of an exercise occurs after the deadline, the above late penalties will apply. There is no dependency on the amount of lateness.

NOTE 2: The late assignment is counted by week. E.g., the penalty for not completing one or five questions for a particular week is the same.

NOTE 3: As students may add/drop during Weeks 1-2, the penalty for late submissions for Weeks 1-2 will be automatically waived (no reason required). However, submissions are still required.

NOTE 4: International students or students travelling overseas (regardless of your travel arrangement) are subject to the same grading rule.

NOTE 5: Students can still view and submit answers after the due date (for self-study purposes). Grades will be calculated based on the last submission before the deadline.

Penalties will not be waived after W3 (W3 inclusive) for any reason, including but not limited to, computer/internet problems, sudden illness, family emergency, "I forgot," etc. To avoid penalties, please plan ahead and refrain from last-minute submissions.

• Assignment grading

As noted, late submissions will receive a penalty and will not be marked. Submissions made before the deadline will be marked based on the last attempt.

Specifically, students are allowed unlimited attempts at the questions before the deadline. The marks will be decided only based on the last attempt. Note that detailed feedback and hints for the questions will be shown after you submit the 1st attempt. That is, students can obtain full marks by redoing the tests.

Finally, you can review your submission status, past e-learning questions and answers under My Grade on the NTULearn website.

4. Group project (20%)

Each project group should consist of a maximum of five students (exceptions must be granted by the instructor) from the same class.

The deliverables include (1) a group presentation video not longer than 8 minutes (15%) (2) a one-pager self-reflection + peer reviews (5%).

We will keep track of all assignments (current & past). Please follow the guideline of Academic Integrity when preparing this assignment to avoid disciplinary actions due to plagiarism.

Please note that we expect all students in a group to have the highest standard of work ethic and contribute earnestly and equally to the deliverables. As in any teamwork, students should also strive to resolve individual differences among group members and work collaboratively. As such, students from a project group in principle should receive the same marks (with necessary adjustments made according to individual presentation performance). The instructor will reserve the right to intervene and moderate the mark should major anomalies come to his/her attention.

Formative Feedback

Students will receive formative feedback after completing the online exercises that follow the online lecture. Additional feedback will be provided by the instructor during the class.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level	
Decision Making	Basic	
Digital Fluency	Basic	
Problem Solving	Basic	

Course Policy

Policy (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. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

Students should complete all assigned pre-class readings and activities, attend all seminar classes punctually, and take all scheduled assignments and tests by due dates. Students are expected to follow up with course notes, assignments and course-related announcements for seminar sessions they have missed. Students should participate in all seminar discussions and activities.

Policy (Absenteeism)

Absence from class without a valid reason may affect your learning and 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. Students are also obliged to inform their course instructor of their absence at their earliest convenience. Tardy notifications may not be accepted.

Policy (Others, if applicable)

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