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 Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2024/AY2025
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Chew Chee Hua, Neumann
Course Author Email	neumann.chew@ntu.edu.sg
Course Title	Analytics I: Visual and Predictive Techniques
Course Code	BC2406
Academic Units	4
Contact Hours	52
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	AB1202
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

Most organizations are data rich and information poor. The large volumes of data in an organization are “oilfields” rich in information content that are pending extraction with the right tools and models. Analytics involves the art of data exploration, visualization, communication and the science of analyzing large quantities of data in order to discover meaningful patterns and useful insights to support decision-making. The primary objective of this course is to introduce students to various techniques available to extract useful insights from the large volumes of data. At the end of the course, students will not only see the substantial opportunities that exist in real world, but also learn techniques that allow them to exploit these opportunities.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Identify aspects of business problems that could be fruitfully solved by Analytics.
ILO 2	Apply selected Analytics techniques to solve the business problem.
ILO 3	Evaluate performance of the Analytics techniques.
ILO 4	Explain the workings and results of the selected Analytics techniques in the context of the business problem to client/employer.
ILO 5	Propose business solutions based on insights from the Analytics techniques.

Course Content

1.Fundamental Analytics Concepts and Industry Practice 2.Data Exploration and Summaries 3.Data Structures and Visualization 4.Data Cleaning and Preparation 5.Linear RegressionBest Practice 6.Logistic RegressionBest Practice 7.Classification and Regression Tree (CART) Part 1: Decision Rules, Classification Tree and Cross Validation. 8.CART part 2: Pruning, Surrogates and Regression Tree. 9.Text Mining and Sentiment Analysis 10.Clustering[eLearningtopic]

Reading and References (if applicable)

Main Textbook: Chew C.H. (2020). Artificial Intelligence, Analytics and Data Science, Volume 1: Core Concepts and Models. Cengage. Supplementary References: [1] Sanchez (2018). Handling Strings with R. eBook: https://www.gastonsanchez.com/r4strings/ [2] Siegel and Robinson (2018). Text Mining with R. O'Reilly. eBook: https://www.tidytextmining.com/

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Course Overview and Introduction to Analytics	1	Main Textbook Chap 1.		
2	Fundamental Analytics Concepts and Industry Practice	2,3	Main Textbook Chap 2.		
3	Data Exploration and Summaries	2,3,4	Main Textbook Chap 3.		
4	Data Structures and Visualization	1,2,3	Main Textbook Chap 4.		
5	Data Cleaning and Preparation	1,2,3	Main Textbook Chap 5.		
6	Linear Regression	1,2,3	Main Textbook Chap 6.		
7	Logistics Regression	1,2,3	Main Textbook Chap 7.		
8	Classification & Regression Tree (CART) Part 1: Decision Rules, Classification Tree and Cross Validation	2,3,4	Main Textbook Chap 8.		
9	Classification & Regression Tree (CART) Part 2: Pruning, Surrogates and Regression Tree	2,3,5	Main Textbook Chap 8.		
10	Clustering for Analytics	2,3,4	eLearning [week TBC]		

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	Text Mining & Sentiment Analysis	2,3,5	Main Textbook Chap 10.		
12	Computer Based Assessment	2,3,5			
13	Project Presentation	2,3,5			

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Seminars with quick check questions to validate understanding and stimulate discussions.	Interactive seminar sessions where there are ample opportunities for open discussion on the concepts. Open ended questions are strategic placed to stimulate critical thinking and discussions, and to emphasize the most important point. Quick poll questions allow instructor to gauge the level of understanding of a key concept.
Project	Opportunity to work in a team and develop an Analytics solution end-to-end (from business analysis, problem identification, data acquisition, analytics techniques, to written report, slides, presentation and recommendations) so as to understand how to do Analytics in the real world, and prepare students for future employment.
Assignment	Opportunity to apply and evaluate effectiveness of selected Analytics technique in a given business scenario with a given real-world large dataset.
In-Class Learning Activities	Analytics require skills which are practical in nature and cannot be achieved by reading only. In-Class learning activities provide instructor guided hands-on experience with specially designed problems and datasets to reinforce concept understanding and concept application. Immediate feedback at end of activities reinforce learning and illuminates common pitfalls, mistakes and misunderstanding.
End of Seminar Formative Quiz	Quiz to be taken by each student at end of each seminar validates each student understanding and reveal most difficult areas. Provide timely opportunities for instructor to quickly clarify mistakes and misunderstanding before they fester and snowball in future topics.

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(Class Participation & Individual Presentation)	ILO1, ILO4, ILO5.	Critical Thinking	30	Individual	Holistic	Multistructural
2	Continuous Assessment (CA): Assignment(Assignment)	ILO2, ILO4, ILO5.	Problem Solving & Decision Making	10	Team	Holistic	Multistructural
3	Continuous Assessment (CA): Project(Project (w. individual Presentation)*)	ILO2, ILO3, ILO5.	Written & Oral Communication	30	Team	Holistic	Multistructural
4	Continuous Assessment (CA): Test/Quiz(Computer Based Assessment)	ILO2, ILO3, ILO5.	Problem Solving & Decision Making	30	Individual	Holistic	Multistructural

Description of Assessment Components (if applicable)

*: All students must present their work and individual presentation will be separately assessed, in addition to written project report, slides and team presentationas a whole.

#: Peer Evaluation is mandatory and team member marks may be adjusted based on ratings (as given in Peer Evaluation Rubrics) and peer comments. A sample is provided in Annex A(i).Peer evaluation will openin the last teaching week of the semester to be submitted by midof the nextweek. Self-evaluationand self-reflection arealso included.

Formative Feedback

Timely verbal feedback will be provided on assignments, projects and individual presentations.Verbal and written feedback will be provided on project proposal and in-class learning activities.

NTU Graduate Attributes/Competency Mapping

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

Attributes/Competency	Level
Communication	Intermediate
Decision Making	Intermediate
Digital Fluency	Basic
Problem Solving	Intermediate
Critical Thinking	Intermediate

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)

You are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually, submit graded assessmentsand peer evaluation form by due dates. You are expected to take responsibility to follow up oncourse notes,activities, assignments and course related announcements for seminar sessions youhave missed. You are expected to participate in all seminar discussions and activities.

Policy (Absenteeism)

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate, LOAand participation in NTU's approved activities supported by an excuse letter from the relevant bodies.If you miss a seminar or assessment, you must inform the course instructor via email prior to the start of the classor at the earliest opportunity feasible.

Policy (Others, if applicable)

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 inmaintaining 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 websitefor more information. Consult your instructor(s) if you need any clarificationabout the requirements of academic integrity in the course.

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Last Updated By: Rohit Bhatnagar (Dr)