

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	AY2024-2025
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1 Semester 2
Course Author * Faculty proposing/revising the course	Teoh Teik Toe
Course Author Email	ttteoh@ntu.edu.sg
Course Title	AI in Accounting and Finance
Course Code	BC3409
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	BC2406
Co-requisites	NIL
Pre-requisite to	NIL
Mutually exclusive to	NIL
Replacement course to	NIL
Remarks (if any)	NIL

Course Aims

This is an introductory course designed for business or accountancy or Finance undergraduate students who are interested to learn how to manage data, conduct business analytics programmatically, create AI model to automate business processes and create predictive model to increase profitability or return. It is oriented to enhance their technical skillset.

The aim of this course is to provide a broad understanding on how to manage data, the process of preparing data for analysis, basics of analytics, using AI to automate financial analysis process and generate accounting reports. This course will equip you with the ability to write customized solutions to make informed business decisions, integrate statistical libraries for data analysis, create AI models to automate accounting and financial process. This module will provide you with individual hands-on practices to hone your coding skills and opportunities to develop coding solutions in a team. We utilize R and Python language as the medium of learning because it is one of the most in-demand coding language and its user-friendly syntax is well suited for the beginner level. You will utilise modern development tools to turn information into insights including Keras' Deep Learning model, tensorflow, GenAI API, web3 and Cloud.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Write codes that allow you to solve Accounting and Finance problem programmatically by creating AI model using Python, Keras and API.
ILO 2	Manage data to sufficiently derive, communicate analytics outcome and eventually create AI model in Accounting and Finance.
ILO 3	Implement a simple system in cloud including engineering work in implementing AI model in Accounting and Finance.

Course Content

This course adopts a blended learning approach where asynchronous e-learning and synchronous teaching in seminar setting are combined to achieve learning objectives. Asynchronous e-learning includes pre-recorded lectures and the weekly seminar provides a channel to exchange understanding and best coding practice. You will learn through a wide range of learning materials, such as online references, textbooks, videos, pre-readings, in-class activities, coding discussion and paired work. This course first provides an overview of the development environment of programming language. You will then move on to pick up language semantics like coding syntax, variables, methods, functions, mathematical operators, Boolean operators, decisions, compound decision, control structures and iterations. These will help you to build a holistic understanding on programming basics and the ability to write code independently. The data modelling part covers the understanding of business rules, entities, relationships, and attributes to construct a database followed by how it connects to code. The course will also cover foundation of business analytics including how to define problem statements in the business context, data preparation, data transformation, data consolidation, data analysis, and data visualization.

Reading and References (if applicable)

extbooks: <https://1drv.ms/f/s!Aik2a4x7tvLygsc0TsKqobQ1I9P7tA?e=GdZNNh>

(TT1) TeikToe Teoh Artificial Intelligence With Python - Machine Learning. Foundations, Methodologies, and Applications, 1st 2022 Edition, Springer Nature, ISBN - 9789811693229

(TT2) TeikToe Teoh Convolutional Neural Networks for Medical Applications (SpringerBriefs in Computer Science) 1st ed. 2023 Edition, ISBN - 978-9811988134

(TT3) TeikToe Teoh, AI in Business Management, 1st 2023 Edition, Springer, ISBN 978-9819945573

(TT4) Teoh Teik Toe, Zheng Rong, Introduction to Cloud Computing and AWS,
(https://1drv.ms/b/s!Aik2a4x7tvLyjM4d_DBI2yHyQUFNEQ?e=pNUmJH)

(TT5) Teoh Teik Toe, Goh YuJin, Generative Artificial Intelligence,
(<https://1drv.ms/b/s!Aik2a4x7tvLyjNEjGCpm20hgfpIDHA?e=fe5MZA>)

(TT6) Teoh Teik Toe, Derrick Tay, Artificial Intelligence for Finance,
(<https://1drv.ms/b/s!Aik2a4x7tvLyjLYFdVaalbmLnl879g?e=Jf9oPs>)

(TT7) Teoh Teik Toe, Web3, Blockchain, Decentralized Application Programming,
(<https://1drv.ms/b/s!Aik2a4x7tvLylclv5ml5EbDqVZ84BQ?e=uakTxO>)

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Intro to AI: • Today's AI • Set programming tools such as anaconda • Financial LAM	1	TT1 Chap 1 - 7; TT3 Chap 1-3;	In-person	Create a web application on google makersuite I
2	Cloud Computing: • Render and Python Anywhere • Financial LAM	1,2	TT1 Chap 1 - 7	In-person	Create a web application on google makersuite II
3	Structured Data: Decision Tree & Neural Network : • CART • Random Forest • XGBoost • Financial LAM	1,2	TT1 Chap 8 - 13; TT3 Chap 1-3, 9-16	In-person	Bankruptcy Analysis
4	Structured Data: Unsupervised Learning (E Learning): •Clustering • Association Rules • Anomaly Detection • Financial LAM	1,2	TT1 Chap 14 - 17; TT2 Chap 1-6; TT3 Chap 4	Online	LAMS and Quiz
5	Structured Data: Consultation for Final Assignment (Due end of week 5)	1,2	TT4 Chap 1-7	In-person	Final Assignment Review

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
6	Unstructured Data: Speech & Text: • Speech Recognition using Google • Text Sentiment using Blob • Text Classification (one hot encoding) • Financial LAM	3	TT1 Chap 14 - 17; TT2 Chap 1-6	In-person	Review and Spam Text Analytics I
7	Unstructured Data: Text: • Text Classification (tfidf encoder, Fast Text by Facebook, Bert by google – Transfer) • Chatgpt (openAI)	1, 2	TT1 Chap 14 - 17; TT2 Chap 1-6	In-person	Review and Spam Text Analytics II
8	Unstructured Data: Image: CNN	1,2	TT1 Chap 14 - 17; TT2 Chap 1-6	In-person	Pneumonia Image Classification using CNN I
9	Unstructured Data: Image: • Resnet by Microsoft, Inception V3 by Google, ViT (transformer) by Google • image GPT (openAI, MidJourney)	1,2	TT2 Chap 1-6	In-person	Pneumonia Image Classification using CNN II
10	Unstructured Data: Generative AI: • Replicate • Music • Video	1,2	TT1 Chapter 14, TT5 1-7	In-person	replicate, fal, makersuite API programming

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	Web3 Decentralized Web Application	1,2	TT7 Chap 1-13	In-person	Creating a financial web3 DApp application
12	Sequential Data (E Learning): • Time Series • RNN	3	TT3 Chap 5	Online	LAMS and Quiz
13	Conclusion and Project Presentation: • Group project presentation	1,2,3	NIL	In-person	Group Project

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Seminar Discussions	Lecture content will be pre-recorded and you are expected to complete the relevant content before each seminar. Seminar discussions allow ample opportunities to clarify content, concepts and demonstrate the analytical tools to you as well as to hear about your intuition, experience and difficulties pertaining to the content. It also offers the opportunity to assess your ability to think critically and articulate clearly.
Coding Demonstration	This allows the instructor to demonstrate programming codes and guide you through the steps of solving business analytics problem.
In-class Activities and Exercises	This would allow you to get your hands dirty and solve simple to challenging problems and apply the programming and data modelling knowledge covered in the course.
Code Discussions	This teaching format allows you to have a highly interactive learning environment where you will benefit from getting online and immediate feedback about your coding solution from instructor and peers coding evaluation.

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)	1, 2, 3	Class Participation	15	Individual	Holistic	Multistructural
2	Continuous Assessment (CA): Test/Quiz(Practical Assessment)	1,3	AK , PSDM	45	Individual	Holistic	Multistructural
3	Continuous Assessment (CA): Project(Group Project)	2,3	PSDM	30	Team	Holistic	Multistructural
4	Continuous Assessment (CA): Presentation(Individual Presentation)	2,3	Oral Comm	10	Individual	Holistic	Multistructural

Description of Assessment Components (if applicable)

NIL

Formative Feedback

<p>The seminar will be interactive and your inputs will be highly encouraged and assessed. Feedback will be provided during the class discussions. For practical assessment, the instructor will discuss common mistakes and weaknesses, and provide suggestion. For the group project, there will be a Q&A segment where the instructor will ask questions and provide feedback.</p>

NTU Graduate Attributes/Competency Mapping

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

Attributes/Competency	Level
Communication	Basic
Digital Fluency	Intermediate
Problem Solving	Intermediate
Information Literacy	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)

Your responsibilities include attendance, punctuality, preparation and participation.

(1)Attendance: You are required to attend at least 75% of the seminars.

(2)Punctuality: You are expected to be punctual and arrive before the start of class, as late arrivals will be disruptive to class activities and considered disrespectful to the instructor and fellow students. For submission of course requirements, you are required and expected to follow the submission deadlines.

(3)Preparation: You are expected to prepare for each seminar by viewing pre-recorded lectures, reading and working on all assigned material prior to seminar. The quality of you and your peers' learning will largely depend on how well prepared you are for class.

(4)Participation: Once in class, you are expected to contribute to class discussions and exercises as well as ask questions whenever in doubt. You are also expected to observe respectful behaviour such as raising your hand before speaking, not interrupting other students, not using electronic devices unless required for problem solving exercises, and not causing any distractions to fellow students.

(5)It is compulsory for you to complete a peer evaluation for the group work that you had done in this course. All members must be present during the final presentation.

Policy (Absenteeism)

You are required to attend at least 75% of the seminars.

Policy (Others, if applicable)

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