Hong Kong Baptist University
Faculty of Science
Department of Mathematics

Title (Units): ORBS7300 Data Analytics with Programming (3,3,0)

Course Aims: This course introduces students the basic concepts of data analytics and equip the skill to build the model to solve the problem theoretically and practically. The programming techniques covered by this course will better help students to prepare for various employment opportunities.

Prerequisite: No

Prepared by: Yau Chin Ko

Remarks: This course is delivered by staff of HKBU.

Course Intended Learning Outcomes (CILOs):

Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
1	Explain the fundamental principles of data analytics
2	Identify circumstances in which particular data analytics methods are applicable
3	Write program and apply tools to perform data analytics

Teaching & Learning Activities (TLAs):

CILO	TLAs will include the following:
1,2,3	Lectures with rigorous mathematical discussions and concrete examples. The lecturer will constantly ask questions in class to make sure that the majority of students are following the teaching materials.
1,2,3	Assignments to monitor both students' learning and mastering of the taught materials. In addition, common mistakes will also be addressed and analyzed.

Assessment:

No.	Assessment Methods	Weighting	CILO Addressed	Remarks
1	Assignments and class exercises.	50%	all	Assessments and class exercise are designed to measure how well the students recognizing of the theory, techniques, and applications of data analytics. This may involve, but not limited to, in class discussions of rigorous technical problems and their solutions.
2	Project	50%	2,3	A written report (~2000-4000 words) on the use of data analytics applied to a realistic case-study problem. The coursework will assess students' comprehension of key topics introduced in the course, as well as require them to demonstrate their model building and analytical skills.

Course Intended Learning Outcomes and Weighting:

Content	CILO No.	Teaching (in hours)
1. Introduction to Data Analytics	1,2	6
2. Introduction to Programming Concept	1,2	12
3. Method of Data Analytics	1,2,3	15
4. Application of Data Analytics	1,2,3	6

References:

1. Paul Wilmott, Machine Learning: An Applied Mathematics Introduction, Panda Ohana Publishing, 2019.
2. Francois Chollet, Deep Learning with Python, Manning Publications Company, 2018.
3. Charu C. Aggarwal, Neural Networks and Deep Learning, Springer, 2018.
4. Charu C. Aggarwal, Linear Algebra and Optimization for Machine Learning, 2020.
5. Joel Grus, Data Science from Scratch: First Principles with Python, 2nd Edition, O'Reilly Media, 2019.
6. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media, 2019.
7. Marc Peter Deisenroth, A. Aldo Faisal and Cheng Soon Ong, Mathematics for Machine Learning 1st Edition, Cambridge University Press, 2020.
8. Alex Berson and Stephen J. Smith, Data Warehousing, Data Mining, & OLAP, McGraw Hill, 2001.
9. Berry, Michael J.A. and Gordon Linoff, Mastering Data Mining, John Wiley & Sons, 2000.
10. P. Cabena, P. Hadjinian and R. Stadler, Discovery Data Mining From Concept to Implementation, Prentice Hall, 1997.
11. Han and M. Kamber, Data Mining: Concepts and Techniques, The Morgan Kaufmann Publishers, 2001.
12. Michalski Ryszard et al, Machine Learning and Data Mining Methods & Applications, John Wiley & Sons, 1998.
13. Ephraim Turban and Jay Aronson, Decision Support Systems and Intelligent Systems, Prentice-Hall, 2001.
14. Usama M. Fayyad et al, Advances in Knowledge Discovery and Data Mining, MIT Press, 1996.

Course Content in Outline:

Topic	Hours

I. Introduction to Data Analytics — 6

II. Introduction to Programming Concept — 12
   A. Basic Programming Concept
   B. Variable and Data Structure
   B. Conditional Statement
   C. Looping
   D. Function Definition

III. Method of Data Analytics — 15
   A. Association Rule Mining
   B. Clustering
   C. Decision Trees
   D. Machine Learning Techniques
   E. Classification and Regression Tree (CART)
   F. Neural Networks and Deep Learning

IV. Application of Data Analytics — 9
   A. Case Studying

(Approved by the Science Faculty Board Meeting by circulation in August 2024)
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