COURSE OUTLINE

School: Advanced Informatics School (UTM AIS) Universiti Teknologi Malaysia	**Page** : **1 of 6**
Code & : MANB 1153 **Course Name** : Data Mining & Business Analytics **Total Hours** : 42	**Semester** : 1 **Academic Session** : 2016/2017

Lecturer :

Room No. : Sekolah Informatik Termaju, UTM *International Campus*, JalanSemarak 54100 Kuala Lumpur

Telephone No. :

E-mail :

Synopsis : This course is about data mining and business analytics, the computational paradigm to find pattern and regularities in databases, perform prediction and forecasting, and generally improve their performance through the interaction with data. Business analytics allows discovering, analyzing and acting on data in business domain. It is about learning from the past to uncover trends and predict likely outcomes. Moreover, in data mining analytics it gives a framework to analyze data over time, leading to more refined outcomes and corrective actions. This course will cover the issues related to the key element of general process of Knowledge Discovery and predictive analytics that deals with extracting useful knowledge from raw data. The process includes data selection, cleaning, coding, using different statistical and machine learning techniques and visualization of the generated structures. This course will also cover the techniques and topics that are widely used in real-world data mining projects including classification, clustering, feature selection and etc. At the end of this course, students are able to understand the principles of data mining and the business analytics and obtaining hands-on experience of implementing data mining projects and therefore will greatly improve the competitiveness of students in business intelligence and analytics career as well as enhance their research skills.

LEARNING OUTCOMES

By the end of the course, students should be able to:

No.	Course Learning Outcome	Programme Outcome	Taxonomies (C, P, A)	Weightage (%)	Assessment Methods
CO1	**Combine** techniques, strategies, and methodologies to construct of data mining and predictive analytics.	**PO1**	**C6**	**A, F**	**F = 15%** **A = 15%**
CO2	**Master** the data mining and analytic application software and tools for analyzing structured data.	**PO3**	**C6**	**A, F, PR**	**A = 15%** **PR = 10%** **F = 15%**
CO3	**Demonstrate** an appropriate mining strategy for given real		**A4** **CS1 – CS5**	**PR, Pr**	**PR = 10%** **Pr = 5%**

	data set in order to solve real world problems and research by finding new ideas and alternative solutions.	**PO5**			
CO4	**Complete** a project to solve a case study problem using lifelong learning skills to find and manage relevant information from many sources.	**PO6**	**A4** **LL1-LL3**	**PR, Pr**	**PR = 10%** **Pr = 5%**

Legend:
PO: Program Outcome A: Affective P: Psychomotor Ob: Observation AP : Academic Publication
SR: Self- Reflection LL: Lifelong Learning C: Cognitive CTPS: Critical Thinking and Problem Solving As: Assignment Pr: Presentation F: Final Exam T: Test Q: Quiz PR: Project Report
PA: Peer-Assessment SA: Self-Assessment LS : Leadership Skill SP: Seminar Paper

STUDENT LEARNING TIME (SLT)

Teaching and Learning Activities	**Student Learning Time (hours)**
1. Face-to-Face Learning	
a. Lecturer-Centered Learning i. Lecture	 22
b. Student-Centered Learning (SCL) i. Laboratory/Tutorial ii. Student-centered learning activities – Active Learning, Project Based Learning	 - 20
2. Self-Directed Learning	
a. *Non-face-to-face learning* or student-centered learning (SCL) such as manual, assignment, module, etc. a. NALI b. MOOCS c. Blended Learning	 22 - 25
b. Revision	10
c. Assessment Preparations	10
3. Formal Assessment	
a. Continuous Assessment	8.5

b. Final Examination	2.5
Total (SLT)	**120**

TEACHING METHODOLOGY

PO1	Possessed detail and in depth knowledge and specific discipline or professional area including relevant professional knowledge and skills with global perspective	• Involve discussions • Critic ideas • Create hypothesis • Seek opinion from others	• Knowledge sharing • Cooperative learning	• Subject Knowledge
PO3	Ability to demonstrate critical thinking and creative problem solving;	• Involve discussions • Critic ideas • Seek opinion from others • Think scholarly	• Guided Lectures • Group Discussion • Paper Critique • Knowledge sharing	• Subject Knowledge
PO5	• Ability to acquire, organize, evaluate and present ideas using appropriate technology; • Ability to demonstrate open-mindedness and receptiveness to new ideas.	• Express ideas in oral and written communication • Peers involvement • Defend idea	• Problem Based Learning • Project based learning	• Interaction • Presentation
PO6	Ability to conduct independent work or studies.	Independent and interdependent works	Problem based learning	• Knowledge acquisition • Curiosity of the latest knowledge

WEEKLY SCHEDULE

Week	Topics
Week 1	Principle of Data Mining • Stages Of Data Mining Process • OLAP (Online Analytical Analytics Processing) – the Motivations • Data Cube Implementation and Operations Data Mining Software and Applications

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Week 2 -3	Data Pre-Processing • Data Cleaning • Data Transformation • Data Reduction • Discretization and Generating Concept Hierarchies • Introduction to WEKA – the Data Mining Systems • Experiment with WEKA – filters and discretization Data Mining Knowledge Representation • Task Relevant Data • Background Knowledge • Interestingness Measures • Representing Input Data and Output Knowledge • Visualization • Experiment with WEKA – visualization
Week 4-5	Attribute-Oriented Analysis • Attribute Generalization • Attribute Relevance • Class Comparison • Experiment with data mining tools – filters and statistics Association Rules • Generating Item Sets and Rules Efficiently • Correlation Analysis • Example: Mining Weather Data • Experiment with data mining tools – mining association rules
Week 6-7	Business Analytics – Classification (Decision Trees) • Decision Tree Induction – Basic Principle • Measures of Diversity • Decision Tree Algorithms Business Analytics – Classification (Decision Trees) • Decision Tree Induction – Basic Principle • Measures of Diversity • Decision Tree Algorithms • Experiment with data mining tools – decision tree Business Analytics – Prediction • The Prediction Task • Statistical (Bayesian) Classification • Bayesian Networks • Instance-Based Methods (nearest-neighbor) • Linear Model • Experiment with data mining tools – prediction
Week 8	SEMESTER BREAK
Week 9-11	Business Analytics – Classification (Multi - Instant Learning) • Aggregating the Input

	• Aggregating the Output Business Analytics – Clustering • Basic Issues in Clustering • Partitioning Methods: K-Means, Expectation Maximization (EM) • Hierarchical Methods: Distance-Based Agglomerative and Divisible Clustering • Conceptual Clustering: Cobweb • Experiment with data mining tools – k-means, Cobweb, EM
Week 12-13	Evaluating What Have Been Learned • Basic Issues • Training and Testing • Estimating Classifier Accuracy (Holdout, cross-validation, leave-one-out) • Combining Multiple Models (Bagging, Boosting, Stacking) • Experiment with data mining tools – Training and Testing Mining Real Data • Pre Processing data from real domain (for example: patient's data) • Applying various data mining techniques to create a comprehensive and accurate model of the dat CASE STUDY PROJECT REVIEW AND DISCUSSION
Week 14 - 15	Project Presentation and Examination Review

REFERENCES :

1) F. Provost and T. Fawsett (2013). Data Science for Business: What you need to know about data mining and data-analytic thinking: O' Reilley Media
2) J. Ledolter (2013). Data Mining and Business Analytics with R: John Wiley & Sons
3) G. K. Gupta (2011). Introduction to Data Mining with Case Studies. (Second Edition): Prentice Hall
4) Bing Liu. (2007). Web Data Mining: Exploring Hyperlinks, Contents and Usage Data: Springer-Verlag Berlin
5) Ian H. Witten and E. Frank (2005). Data Mining: Practical Machine Learning Tools and Techniques (Second Edition): Morgan Kaufmann.
6) David J. Hand, H. Manilla, P. Smyth (2001). Principle of Data Mining: MIT Press.

GRADING:

No	Assessment	Quantity	% Each	%Total
1	Assignment	3	10	30
2	Case Study Project	1	30	30
3	Project presentation (Oral)	1	10	10
4	Final Exam	1	30	30
			TOTAL	100%

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