

COURSE INFORMATION

School/Faculty:	Computing/Engineering	Page:	1 of 6
Program name:	Bachelor of Computer Science (Graphics & Multimedia Software)		
Course code:	SCSV4233	Academic Session/Semester:	2020/21-2
Course name:	Data Visualisation	Pre/co requisite (course name and code, if applicable):	Nil
Credit hours:	3		

Course synopsis	This course presents the theoretical and technical aspects of data visualization in various applications. It emphasises on the process of visualization, which include various data sources, reconstruction of data, data models and data model representation techniques. Real applications of data visualization such as used in medical, scientific, engineering, biotechnology and environment applications are also discussed.			
Course coordinator (if applicable)	Dr. Farhan bin Mohamed			
Course lecturer(s)	Name	Office	Contact no.	E-mail @utm.my
	Dr. Farhan Bin Mohamed			farhan
	Prof. Dr. Mohd Shafry Bin Mohd Rahim			shafry

Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO (Code)	*Taxonomies and **generic skills	T&L methods	***Assessment methods
CLO1	Describe and reproduce the concept of data visualization in various applications.	PLO1 (KW)	C3, P3, A1	Lecture, Tutorial, Practical	A, FE
CLO2	Apply their theoretical and technical knowledge to formulate and discuss the solution to the issues that arise in the development of visualization systems.	PLO2 (TE)	C5, P2, A2	Lecture, Tutorial, Practical	PR, PD, FE
CLO3	Develop a prototype of visualization system according to principles and guidelines of data visualization through report writing and presentation by group.	PLO6 (SC)	C6, A5 SC1, SC3, TW1	Practical, Project-based learning	PR, PD, FE
Refer *Taxonomies of Learning and **UTM's Graduate Attributes, where applicable for measurement of outcomes achievement *** L – Lecture; T – Tutorial; TE – Test ; PS – Problem Solving; PR – Project ; F – Final Exam					

Prepared by: Name: Dr. Farhan bin Mohamed Signature: <i>farhan</i> Date: 15 March 2021	Certified by: Name: Signature: Date:
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Details on Innovative T&L practices:

No.	Type	Implementation
1.	Active learning	Conducted through in-class activities and tutorials
2.	Project-based learning	Conducted through software testing project assignments.

Weekly Schedule:

Week 1	Module 1: Introduction to Data Visualization - Definition, Goals and History of Visualization - Component of Data Visualization System - Applications of Data Visualization
Week 2	Module 2: Principles of Visualization - Visualization Framework - Models, Colours, and Gestalt Theory
Week 3	Module 3: Visualization Pipelines - Data sources, Pipelines and Sources of Error
Week 4	Module 4: Data Representation - Domain and data values & Grid (unstructured, structure) - Scattered Data & Classifications Schemes
Week 5	Module 5: Mapping Techniques - Diagrams and Charts; Function plots and height fields - Isolines/Colour coding; Glyphs and icons
Week 6	Module 7: Indirect Volume Visualization - Scientific Visualisation introduction - Volume rendering pipeline; Marching cubes and Acceleration techniques
Week 7	Module 8: Direct Volume Rendering - Classification (transfer function, segmentation) - Volume shading and Slicing and Ray casting - Texture-based volume rendering
Week 8	
Week 9	MID-SEMESTER BREAK (Module 6: VTK Setup)
Week 10	Module 9: Vector field visualization - Basic math of vector fields - Arrow and glyphs; Particle tracing/Particle tracing on grids - Topology-based visualization & 3D vector fields

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Week 11	Module 10: Data Visualization in Scientific/Medical Application
Week 12	Module 11: Personal and Group Project Development & Delivery
Week 13	- Volume Visualization Application & Personal Project Presentation
Week 14	- Vector-based Visualization Application & Group Project Presentation
Week 15	Summary
W 16 - 18	REVISION WEEK AND FINAL EXAM

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):

Team working
Writing technical report

Student learning time (SLT) details:

Distribution of student Learning Time (SLT) Course content outline					Teaching and Learning Activities		TOTAL SLT
	Guided Learning (Face to Face)				Guided Learning Non-Face to Face	Independent Learning Non-Face to face	
CLO	L	T	P	O			
CLO 1	18h	10h	10h		4h	3h	45h (48h)
CLO 2	18h	10h	12h		4h	3h	47h (60h)
CLO 3			2h	4h	2h	1h	9h (12h)
Total SLT	36h	20h	24h	4h	10h	5h	101h (120h)

Continuous Assessment		PLO	Percentage	Total SLT (part of total SLT above)
1	Assignment 1	KW,TE	10	2h
2	Assingment 2	KW,TE	10	2h
3	Assignment 3	TE	10	2h
4	Personal Project	SC,TW	20	5h
5	Group Project	SC,TW	20	5h

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Final Assessment			Percentage	Total SLT
1	Final Examination	KW	30	3h
Grand Total SLT				120h

L: Lecture, T: Tutorial, P: Practical, O: Others

Special requirement to deliver the course (e.g: software, nursery, computer lab, simulation room):

Postgraduate Teaching Assistant (TA)
Software: Visual Studio, VTK Library, Python, Tableau Desktop
Hardware: PC / Cloud Computing

Learning resources:

Main references:

- Data Visualization: Principles and Practice, Second Edition, by Alexandru C. Telea, 2015.

Additional references:

- Data Visualization: The State of The Art, by Frits Post, Springer 2002
- Visual data Mining: Techniques and Tools for Data Visualization, by Ton Soukup et al, John Wiley & Sons, 2002
- Data Visualization Techniques by Bala Krishnamurthy, John Wiley & Sons, 1999
- Visualization Toolkit, An Object Oriented Approach by Will Schroeder, Ken Martin dan Bill Lorensen, John Willey and Sons, 1998.
- Scientific Visualization and Graphics Simulation by Thalmann D, John Willey and Sons, 1990

Online:

<http://elearning.utm.my>

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Academic honesty and plagiarism: (Below is just a sample)

Assignments are individual tasks and NOT group activities (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES)
Copying of work (texts, simulation results etc.) from other students/groups or from other sources is not allowed.
Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words used to explain what you have read. It is not acceptable to retype existing texts and just acknowledge the source as a reference. Be warned: students who submit copied work will obtain a mark of **zero** for the assignment and disciplinary steps may be taken by the Faculty. It is also unacceptable to do somebody else's work, to lend your work to them or to make your work available to them to copy.

Other additional information (Course policy, any specific instruction etc.):

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Disclaimer:

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