Title (Units): **COMP7820 Visual Analytics and Decision Support (3,2,1)**

Course Aims: Students will learn the concepts, methodologies, and techniques of interactive visualization to facilitate analytical reasoning and critical thinking with data, as well as to support decision making.

Prerequisite: Nil

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Describe the fundamental concepts and methodologies of visual analytics and decision support
2	Explain the key interactive visualization techniques for data understanding and analytical reasoning
3	Match relevant interactive visualization techniques to real-world needs for decision support
	Professional Skill
4	Recognize the types of visual analytics and decision support needs in the real world and apply relevant techniques and tools to resolve them
5	Evaluate the design and usability of visual analytics and decision support applications
	Attitude
6	Identify the needs and impacts of visual problem-solving with data in the context of decision making and demonstrate them in various applications

Calendar Description: To provide an interdisciplinary study of visual analytics and decision support. Students will learn the fundamental concepts, methodologies, techniques, and tools in interactive visualization for the purposes of facilitating data understanding, analytical reasoning, and decision making. After successful completion of this course, students will be capable of recognizing the needs and impacts of visual problem-solving with data in the context of decision making and proficient in applying relevant methodologies, techniques, and tools

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1,2,3	Lectures, assignments, and mini-project
4, 5	Lectures, assignments, laboratory classes, and mini-project
5	Problem, laboratory classes, and mini-project
6	Lectures, laboratory classes, and mini-project

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Continuous Assessment – assignments and quizzes/tests	25%	1-6	Continuous assessments are designed to assess the students' progressive mastery of the theories and techniques as well as their applications.
2	Continuous Assessment – mini-project	25%	1-6	Continuous assessments are designed to assess the students' progressive mastery of the theories and techniques as well as their applications.
3	Examination	50%	1-6	The final examination is designed to measure the extent to which the students have reached all of the learning outcomes. Students are required to have a good comprehension of the fundamental concepts, methodologies, and techniques of visual analytics and decision support in various situations and applications.

Assessment Rubrics:

Excellent (A)	• Achieves the first five CILOs, with strong evidence of having achieved the last CILO, demonstrating a good mastery of both theoretical and practical aspects of the knowledge and skills associated with visual analytics and decision support • Able to develop and present sound arguments and correct solutions to problems, accompanied by in-depth analysis and insight • Demonstrates a thorough understanding and solid knowledge of visual analytics and decision support concepts, methodologies, and techniques • Able to draw on a variety of techniques and relevant knowledge and appropriately apply them to new visual analytics and decision support situations and problems
Good (B)	• Achieves the first five CILOs, with evidence of having achieved the last CILO, demonstrating a good understanding of the associated concepts and underlying methodologies • Able to develop solutions to problems, accompanied by adequate explanations • Demonstrates a competent level of knowledge of visual analytics and decision support concepts, methodologies, and techniques • Ability to make use of appropriate knowledge and techniques and apply them to familiar situations and problems
Satisfactory (C)	• Achieves most of the first five CILOs, demonstrating a basic level of understanding of the associated concepts and underlying methodologies • Able to provide acceptable solutions to problems • Demonstrates an adequate level of knowledge of visual analytics and decision support • Ability to make use of some knowledge and techniques and apply them to familiar situations
Fail (F)	• Achieves less than four of the CILOs, with little understanding of the associated concepts and underlying methodologies • Unable to provide solutions to simple problems • Knowledge of visual analytics and decision support falling below the basic minimum level • Unable to apply knowledge and techniques to situations or problems

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Building blocks of visual analytics in decision making	1,6
II	Visual representations from different perspectives	1,6
III	Human visual perception and cognition	1,6
IV	Data transformations, analysis, and representations for visual reasoning	2,3,4,5
V	Analytical reasoning and critical thinking with data	3,4,5,6
VI	Interaction design	3,4,5,6
VII	Evaluation of visual analytics tools	3,4,5,6
VIII	Case studies in practical application areas: Business intelligence, knowledge management, and social media, etc.	3,4,5,6
IX	Existing challenges and future development in visual analytics	1,6

References:

- Schwabish, J. Better Data Visualizations: A Guide for Scholars, Researchers, and Wonks, Columbia University Press, 2021.
- Clarke, E. Data Analytics, Data Visualization & Communicating Data, Kenneth Fornari Publisher, 2023.
- Munzner, T. Visualization Analysis and Design, CRC Press, 2014
- Ware C. Information Visualization: Perception for Design (Interactive Technologies), Morgan Kaufmann, 4th edition, 2020.
- Kirk A. Data Visualisation: A Handbook for Data Driven Design, SAGE Publications Ltd., 2nd edition, 2019.

- Meirelles, I. Design for Information: An Introduction to the Histories, Theories, and Best Practices Behind Effective Information Visualizations, Rockport, 2013
- Keim, D, Kohlhammer, J, Ellis, G, and Mansmann, F (Eds.). Mastering the Information Age: Solving Problems with Visual Analytics, Eurographics Association, 2010 (http://www.vismaster.eu/book/)

Course Content:

Topic

I. Building blocks of visual analytics in decision making

II. Visual representations from different perspectives

III. Human visual perception and cognition

IV. Data transformations, analysis, and representations for visual reasoning

V. Analytical reasoning and critical thinking with data

VI. Interaction design

VII. Evaluation of visual analytics tools

VIII. Case studies in practical application areas: Business intelligence, knowledge management, and social media, etc.

IX. Existing challenges and future development in visual analytics