SM3801: UNDERSTANDING DATA

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Understanding Data

Subject Code
SM - School of Creative Media
Course Number
3801

Academic Unit
School of Creative Media (SM)

College/School
School of Creative Media (SM)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The way we perceive information depends on our sensitivity, which is adjusted and limited to a certain spectrum or level of detail. Our mental/neurological abilities are partly influenced and formed through environmental structures

and experiences. Technological hardware and software are able to acquire information in a quality and quantity that is no longer processable by human senses. This information has to be represented artificially at a level compatible to our perceptivity in order to become accessible. This course aims to provide students an introduction to the techniques of data visualization such as volume visualization, multiresolution methods; cognitive science and other sciences that employ visual representation and information design. Through tutorial exercise, students will be able to develop various visual representation techniques and learn the concepts of different design theories.

This course requires either co-teaching of a professor from science department and a professor from Creative Media or the presence of a faculty member with demonstrable experience as an artist and scientist.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify key components and concepts about cognitive science and data visualization		x		
2	Design and use visual representations (graph theory, physics, network, etc) effectively		x		
3	Process and analyze data and information via graphical means with design principles			x	
4	Produce work that: - Visualize information in 2D and 3D space - Visualize multi-dimensional, quantitative and statistical data - Visualize information with interactive techniques			x	x
5	Create digital art using experimental methods of data and spatial information				x
6	Associate, combine and integrate knowledge from different disciplines (e.g. mathematics, sciences, literature etc.) into course assignments				x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Lectures and practical sessions on the key components and concepts about cognitive science and data visualization	1	

2	Workshop	Graphic design workshops on self portrait, quantitative data and spatial information and graphics	2	
3	Lectures	Discussion on data graphic theories and quantitative data	3	
4	Lectures	Lectures on information design	4, 5, 6	
5	Workshop	Workshop on graphic software and data visualization algorithms	2, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Design, discussion and presentation of assignments and final projects based on knowledge gathered during the course.	1, 2		
2	In-class practical exercises on the practical application of theories and concepts	3, 4, 5, 6	20	
3	Visualization design assignments and projects	3, 4, 5, 6	30	
4	In-class projects and final project	2, 4	50	

Continuous Assessment (%)

100

Examination (%)

0

Assessment Rubrics (AR)

Assessment Task

1. Visualization Design Projects, Final Project

Criterion

Students should demonstrate ability to utilize primary and secondary sources, execute creative ideas and projects. The threshold of 'discovery' lies in a student's proactively turning theory into praxis, to transform course material into self-owned authorship.

Excellent (A+, A, A-)

- Work has strong affective quality and the articulation of personal styles and signature
- Excellent appreciation, exploration and/or application of the aesthetic and expressive qualities of the medium
- Work raises questions and instill insights about the process of conception, creative strategization and production

- Innovative exploration by combining knowledge from different disciplines (e.g. mathematics, psychology, physics, anthropology, etc.) to create an inter-disciplinary project
- Efficient adjustment of plans and strategies in response to resources (time, space, equipment, etc) available with constructive adjustment

Good (B+, B, B-)

- Strong appreciation, exploration and/or application of the aesthetic and expressive qualities of the medium
- Ability to create project/ work that demonstrate the processes of thinking and creative exploration
- Proper adjustment of plans and strategies in response to resources (time, space, equipment, etc) available and constructive feedback/ suggestions

Fair (C+, C, C-)

- Basic appreciation and/or application of the aesthetic and expressive qualities of the medium
- Limited ability to create project/ work that demonstrate the processes of thinking and creative exploration
- Adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

Marginal (D)

- Marginal appreciation of the aesthetic and expressive qualities of the medium
- Marginal ability to create project/ work that demonstrate the processes of thinking and creative exploration
- Limited adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

Failure (F)

- No appreciation of the aesthetics and expressive qualities of the medium
- Fail to create project/ work that demonstrate the processes of thinking and creative exploration
- Minimal adjustment of plans and strategies in response to resources (time, space, equipment, etc) available

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Assessment Task

2. In-Class Discussion

Criterion

This assessment task reviews students' participation and performance in discussions, debates and peer critique during the tutorial sessions. The evidence of 'negotiation', the sign of discovery, lies in students' pre-class preparation and interpersonal sensitivity to his/her peer members.

Excellent (A+, A, A-)

- Active in-class participation, positive listening, strong ability to stimulate class discussion and comment on other points
- In-depth pre-class preparation and familiarity with peer reports and other materials
- Interpret others' views with an open mind and ready to negotiate
- Readiness to share personal insight via analysis and synthesis with informed views
- Constructively critical, thus facilitating the discovery of new issues

Good (B+, B, B-)

- Active in-class participation, positive listening, ability to initiate class discussion and comment on other points
- Adequate pre-class preparation and familiarity with peer reports and other materials
- Interpret opinions effectively

Fair (C+, C, C-)

- Attentive in in-class participation, listening with comprehension, but only infrequently contributing
- Adequate pre-class preparation but little familiarity with peer reports and other materials
- Fair ability in interpreting opinions

Marginal (D)

- Unmotivated to participate in class discussion or comment on other people's views
- Little pre-class preparation and familiarity with peer reports and other materials

- Poor ability in interpreting opinions

Failure (F)
- Unwilling to participate in class discussion and comment on other points, even when requested by the teacher
- No pre-class preparation and familiarity with peer reports and other materials
- Minimal ability in interpreting opinions

Assessment Task

3. Presentation of Assignment and Final Project

Criterion

This assessment will grade on content and fluency of presentation. Students should show their co-operation to conduct a well-organized presentation with their own argument and evidence from readings and notes. The threshold of 'discovery' lied in a student's self initiatives to conduct additional research and to personalize theories for her/his personal daily experience.

Excellent (A+, A, A-)
- Rich, informative content, excellent grasp of the material with in-depth and extensive knowledge of the subject matter
- Rigorous organization, coherent structure, and systematic exposition with a strong sense of narrative
- Superior presentation skills: distinct pronunciation, fluent expression and appropriate diction, exact time-management
- Critical analysis with insightful comments opening up new issues, or suggesting the ability to theorize

Good (B+, B, B-)
- Adequate content with firm grasp of the material that informs the audience on a subject matter
- Reasonable organization, balanced structure and composition
- Good verbal communication: comprehensible pronunciation, fluent expression and diction, fair time-management

Fair (C+, C, C-)
- Adequate content with comprehensive grasp of the material demonstrating basic knowledge of the subject matter
- Fair organization, weak structure and composition
- Fair presentation skills: acceptable pronunciation, expression and diction, fair time-management

Marginal (D)
- Weak content, loose grasp of the general ideas with some knowledge of the subject matter
- Poor organization, structure and composition
- Poor presentation skills: marginal pronunciation, expression and diction, poor time-management

Failure (F)
- Inadequate content, fail to identify the general ideas with knowledge of the subject matter
- No organization, structure or/and composition
- Poor presentation skills: marginal pronunciation, expression and diction, minimal time-management

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Additional Information for AR

All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

Part III Other Information

Keyword Syllabus

Images and Quantities, Space & Cartographic
Color & Information, Time & Space
Micro & Macro readings, Layer & Separation,
Theory of Data Graphics Multifunction Graphical Elements

Pictogram and Chart Design
Optimizing legibility/ Readability
Displaying Mindmaps, News, Connections, Text-based and Numerical Information
Visualization Algorithms and Techniques
Volume Visualization
Multiresolution methods and Interaction techniques

Reading List

Compulsory Readings

	Title
1	Fry, Ben. 2008. Visualizing Data: Exploring and Explaining Data with the Processing Environment. Sebastopol, CA: O'Reilly Media.
2	Steele, Julie, and Noah Iliinsky. Beautiful Visualization: Looking at Data through the Eyes of Experts (Theory in Practice). Beijing; Sebastopol, CA : O'Reilly

Additional Readings

	Title
1	http://www.visualcomplexity.com/
2	Introduction to Information Visualization, Riccardo Mazza
3	Visual Complexity: Mapping Patterns of Information, Manuel Lima