

M1: Module Descriptor Template

Module Code	Pre-requisite Module codes	Co-Requisite Modules code(s)	ISCED Code	Subject Code	ECTS Credits	NFQ Level (CPD)#
					5	
Module Title	Data Visualization					

This Header should be repeated on each page of the Module

School Responsible:

TÁ LEAGAN GAEILGE DEN FHOIRM SEO AR FÁIL / AN IRISH LANGUAGE VERSION OF THIS FORM IS AVAILABLE

Module Overview:

Visualisation facilitates the transformation of data into knowledge. With ever-increasing quantities of data we require assistive methods to help us make sense of, and create value from, the raw information at our disposal. Data Visualisation is a multidisciplinary area drawing upon several different areas of computer science (e.g. psychology, statistics, data mining, graphic design, information visualisation) to deliver meaningful solutions. This module provides students with a brief introduction to the theories underpinning data visualisation, best practice in using visualisations effectively, and practical skills in creating visualisations from datasets. The emphasis of the module is human-centred rather than machine-centred as a central challenge in visualisation is choosing/designing the best visual interface for a task (as dictated by the expected audience). As a foundational step, learning theories, cognitive science and epistemology will be briefly reviewed: how humans perceive the world; how we make sense of what we perceive; how we absorb information; how to interpret meanings in visualizations; and how we learn and memorise what we have perceived. Lastly, this module will provide a practical introduction to the tools and techniques of data visualisation. Through practical instruction, labs and tutorials, students will be equipped to successfully implement some data visualisation techniques.

Learning Outcomes (LO): (to be numbered)

For a 5ECTS module a range of 4-10 LOs is recommended

On Completion of this module, the learner will be able to

1	Demonstrate understanding of how humans perceive the world around them on a general level and absorb complex data/information on a specific level.
2	Demonstrate understanding of how metaphors are used to convey unfamiliar information.
3	Select, formulate and integrate metaphors to suit data-driven tasks
4	Design effective visualizations based on principles from perceptual psychology, cognitive science, graphic design and visual art.
5	Create and deploy successful data visualisations using leading software tools
6	Demonstrate understanding how visualisation is used in story telling
7	
8	
9	
10	

Indicative Syllabus:

Indicative syllabus covered in the module and / or in its discrete elements

1. Overview/Fundamentals: Why Visualization and Its Value: The Purposes for Visualization: Evaluation, Exploration, Presentation
2. Visual Analysis, Collaboration & History
3. Perception/Memory: graphical perception, communication
4. Data: Characteristics & dimensions, data and image models, exploratory data analysis
5. Design Studies / Visualization Design
6. Colour
7. Multidimensional Data Visualization (volume, vector, high-dimensional data, tree and graph)
8. Mapping, Cartography, Geo-spatial Visualization & Oceanography
9. Using Space Effectively
10. Graph Layout and Network Analysis
11. Text Visualization
12. Identifying Design Principles
13. Interaction/Multiples
14. 3D data visualization and 3D interactive interfaces
15. Tools for Visualization
16. Visual Thinking Tools
17. Animation

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Learning and Teaching Methods:

Statements about the various types of learning and teaching methods that are used in the delivery of the module

The learning methods used to achieve the module learning outcomes will involve a combination of lectures, discussions, case studies, problem-solving exercises, work-based learning, readings, project work, self-directed learning, computer-based learning, video and film.

Formal lectures will be balanced with labs and student participation. Students will be introduced to computer-based data visualisation tools and techniques and then expected to show initiative in acquiring skills necessary. Students will be expected to put theory into action by completing tutorials, exercises and independent experiments using a variety of data visualisation tools.

Lab assignments will focus on providing practice using real-world datasets and real world problems.

Total Teaching Contact Hours	39
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Total Self-Directed Learning Hours	61
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Module Delivery Duration:

Indicate if the module is normally delivered for example over one semester or less, or over one academic year etc.

This module will be delivered over one semester.

Assessment

Assessment Type	Weighting (%)	LO Assessment (No.)
Examination	30%	2, 3, 4
Continuous Assessment	70%	5, 6
Module Specific Assessment Arrangements (if applicable)		
(a) Derogations from General Assessment Regulations		
(b) Module Assessment Thresholds		
(c) Special Repeat Assessment Arrangements		

Essential Reading: (author, date, title, publisher)

Tufte, 1984, The Visual Display of Quantitative Information

Yau, 2011, Visualize This: The FlowingData Guide to Design, Visualization, and Statistics (Wiley, 2011)

Fry, Visualizing Data: Exploring and Explaining Data with the Processing Environment, (O'Reilly, 2008)

Supplemental Reading: (author, date, title, publisher)

Bertin, 1979, Semiology of Graphics: Diagrams, Networks, Maps

Noah and Steele, Julie, 2011, Designing Data Visualizations – Iliinsky, (O'Reilly, 2011) Iliinsky, Noah and

Steele, Julie, 2010, Beautiful Visualization, (O'Reilly, 2010)

Ware, Colin, 2004, Information Visualisation, (Morgan Kaufmann, 2004)

Ware, Colin, 2008, The Information Design Handbook, (Rotovision, 2008)

Baer, Kim, 2008, Information Design Workbook, (Rockport, 2008)

McCandless, David, 2010, Information is Beautiful, (Collins, 2010) Tufte, 1990, Envisioning Information

Tufte, 2006, Beautiful Evidence

Tufte, 1997, Visual Explanations: Images and Quantities, Evidence and Narrative

Version No:		Amended By	
Commencement Date		Associated Programme Codes	

Modules that are to be offered as Stand-Alone CPD Programmes must have an NFQ level assigned

*Details of the assessment schedule should be contained in the student handbook for the programme stage.

Date of Academic Council approval