

24/5/2019

14.00 - 16.00pm

CMPU 4032 Geographical Info  
Systems

Basement 3, Kevin Street

Programme Codes: DT211C, DT228, DT282

Module Code: CMPU4032

CRNs: 22529, 22419, 31095

## **TECHNOLOGICAL UNIVERSITY DUBLIN**

KEVIN STREET CAMPUS

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**BSc. (Honours) Degree in Computer Science  
(Infrastructure)**

**BSc. (Honours) Degree in Computer Science**

**BSc. (Honours) Degree in Computer Science  
(International)**

**Year 4**

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**SEMESTER 2 EXAMINATIONS 2018/2019**

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**GEOGRAPHIC INFORMATION SYSTEMS**

MR. MARK FOLEY

DR. DEIRDRE LILLIS

MS. PAULINE MARTIN – DT211C

MR. PATRICK CLARKE – DT228/282

Time Allowed: 2 hours

Answer *three* questions.  
All questions carry equal marks.

1. (a) The *geographic coordinate system* is the reference system, defined by latitude and longitude, for locating features on the Earth's surface. Comment on the practical difficulties with using a single geographic coordinate system as a global reference.  
(9 marks)
  - (b) What problem or problems do *projected* coordinate reference systems attempt to solve? Describe, in general terms, how projected coordinate systems work and the compromises inherent in their use.  
(9 marks)
  - (c) What is the relationship, if any, between *geographic* coordinate systems and *projected* coordinate systems?  
(5 marks)
  - (d) When considering a projected coordinate system such as *Irish Grid* or *Irish Transverse Mercator*, what do the following terms describe?
    - scale factor
    - central meridian
    - longitude of central meridian
    - latitude of origin (or central parallel)
    - false easting & false northing(5 marks)
  - (e) If I have a spatial dataset in the *ESRI Shapefile* format, where might I find the coordinate reference information? How will this be described?  
(5 marks)
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2. (a) When we conceptualize geographic data we talk of *discrete objects* and *continuous fields*. Describe what these terms mean and discuss their implications for representing spatial data in a computer.  
(11 marks)
  - (b) Describe the **Open Geospatial Consortium** (OGC) *Simple Features for SQL* (SFS) Model.  
(11 marks)
  - (c) Describe the importance of *topology* in GIS. What are the advantages and disadvantages of topologically structured data as opposed to simple features data?  
(11 marks)

3. (a) In map design, cartographers describe a map as a visual plan to achieve a goal. Comment on the desirable elements in good map design. You should make reference to the elements you would expect to see in a well-designed map.  
(9 marks)
- (b) In cartography we refer to *visual variables* when considering how to symbolize map elements. What do you understand by the term visual variables. You should also comment on the use of colour in cartographic representation.  
(9 marks)
- (c) When classifying attribute data there are five usual schemes. Describe these and comment on their appropriateness for various data types.  
(5 marks)
- (d) Comment on the use of typography and text placement in enhancing the quality of map design.  
(5 marks)
- (e) What is meant by *balance* and *visual hierarchy* in map design  
(5 marks)
4. (a) In vector data analysis, what is an *overlay* operation? In your answer you should describe the common types of overlay operations and overlay methods.  
(11 marks)
- (b) In raster data analysis, compare and contrast *local* operations, *neighbourhood* operations and *zonal* operations.  
(11 marks)
- (c) In terrain analysis, comment on the creation and use of slope and aspect measures. How might these be useful?  
(6 marks)
- (d) Compare the *Triangulated Irregular Network* (TIN) approach with the *Digital Elevation Model* (DEM) approach as a method for storing and representing elevation data.  
(5 marks)