W211C/403C, W228/403C, W249/403C, W249P/403C

DUBLIN INSTITUTE OF TECHNOLOGY

DT211C BSc. (Honours) Degree in Computer Science (Infrastructure)

DT228 BSc. (Honours) Degree in Computer Science

DT249 BSc. (Honours) Degree in Information Systems / Information Technology (Part-time)

DT249P/1 School of Computing (CPD)

WINTER EXAMINATIONS 2015/2016

GEOGRAPHIC INFORMATION SYSTEMS [CMPU4032]

MR. MARK FOLEY
DR. DEIRDRE LILLIS
MR. ALAN FAHEY
MR. PAUL COLLINS
DR. REM COLLIER

MONDAY 4TH JANUARY 9.30 A.M. – 11.30 A.M.

TWO HOURS

ANSWER **THREE** QUESTIONS.

ALL QUESTIONS CARRY EQUAL MARKS.

1. (a) How would you model a decision process using multi-criteria evaluation? Illustrate your answer with an example.

(13 marks)

(b) Describe some of the issues inherent in using GIS to model spatial processes.

(10 marks)

(c) Describe the role of a "diffusion model" in modelling physical and environmental processes.

(10 marks)

2. (a) Define *isopleth* and *choropleth* maps. Comment on their uses and how they might be constructed.

(12 marks)

(b) Describe the four basic classification schemes to divide interval and ratio data into categories. Comment on the difficulties in chosing one scheme over another.

(15 marks)

(c) It has been said that digital cartography and GIS free map-makers from many of the constraints inherent in traditional (non-GIS) paper mapping. Describe these constraints.

(6 marks)

3. (a) Develop an architectural overview for a typical GIS system using open-source software. You should clearly identify the major components in such a system and describe their function.

(18 marks)

(b) Write notes on the following:

(i) How geographic data is stored in a spatial database with particular reference to the Well-Known Text (WKT) format.

(5 marks)

(ii) The role of Web Map Service (WMS) and Web Feature Service (WFS) in publishing geographic data and the differences between them.

(5 marks)

(iii) The role of cloud services in providing base mapping for a system such as the one you have described in (a) above.

(5 marks)

4. (a) Explain the notion of *Spatial Interpolation.* Discuss *Inverse Distance Weighting* (IDW) as a method of spatial interpolation. Your answer should highlight the pros and cons of this method.

(8 marks)

(b) Describe the usefulness of *slope* and *aspect* measures from a *Digital Elevation Model* (DEM). How are these calculated?

(8 marks)

(c) What is meant by *Viewshed Analysis*? Under what circumstances would this be useful? How is it calculated?

(7 marks)

(d) Briefly describe the following types of spatial analysis:

(i) Queries and reasoning
(ii) Measurements
(iii) Transformations
(iv) Descriptive summaries
(v) Optimization techniques

(10 marks)