**CASA0005- Geographic Information System and Science Coursework Assessment**

This coursework assignment is to test your understanding of geospatial data, tools and analysis. The assignment consists of three parts, which are explained below. The whole assignment will be a single submission, due on **4th January 2019 at 5pm**, maximum 3000 words (excluding any blocks of code or bibliographies).

Your final report will be produced using RMarkdown (<https://rmarkdown.rstudio.com/>) with a word or pdf version submitted to Moodle/Turnitin and the .Rmd file uploaded to your github repository. You may also wish to link to any online interactive content if appropriate (it may not be, it will depend on the composition of your final mini-project).

The three parts of the assessment break down into:

**Part 1 – Mapping and Cartography: A Presentation and Critical Evaluation of Maps Produced Using Different Software Packages.**

**This part is worth 20% of the final assignment - equivalent to 600 words.** You will carry out the work required for this element of the assessment in the first 4 weeks of the course.

You will produce and critically compare two maps, evaluating both the finished product and the cartographic work-flows used to produce them. Your evaluation may encompass (but not exclusively) aspects such as:

* An assessment of the benefits and drawbacks of GUI vs Command line generated maps
* An assessment of the data sources used in their generation
* A review of cartographic good practice and an assessment of your maps as presented
* A review of the workflows used to generate both maps
* Any other relevant considerations such as, scale, uncertainty, MAUP, “lying with Maps” – Political decisions etc.

Part 1 is marked according to the following criteria:

1. **Context and relevance**: Context relating to cartographic practice, software, data, and representational limitations (35%)
2. **Knowledge, understanding, and reflection**: Quality of the critical commentary, reference to literature or other examples of good (or bad) mapping practice. Limits imposed by different software and reflection and interpretations. (35%)
3. **Communication and Overall Presentation**: Quality of the maps (i.e. quality of the cartography, good practice, and potentially flirting with conventions (creativity), and quality of writing. (30%)

**Part 2 – Spatial Analysis Methodologies.**

**20% Equivalent 600 words.** You will carry out the work required for this element of the assessment between weeks 5 and 7 of the course.

Part 2 will test your ability to solve a spatial problem and your ability to logically follow a process, reflecting on any issues that may affect your final answer. You will submit a critical commentary on the process of solving a spatial problem using a variety of analysis methodologies. **You will be set the spatial analysis challenge in Week 6 of the course**.

You should explain:

* Which methods were chosen to tackle the challenge – e.g. what spatial data type? (Shapefile, SimpleFeatures, SP, Geodatabase, Geojson etc. – pros and cons of each).
* Which software did you choose – why?
* Which methods/packages/toolbox tools etc. did you use? Why?
* If you identify more than one way of answering the problem, why did you choose the method you did?
* What was the logical sequence of steps you went through in solving each element of the challenge?
* Problems with data / methods

Part 2 is marked according to the following criteria:

1. **Context and relevance**: Context relating to data types, software, methods, tools, packages, process and framework. (25%)
2. **Applicability and Complexity**: Design, fitness-to-purpose, and (re)usability of the methodology and tools, complexity of the proposed techniques/framework (30%)
3. **Knowledge, understanding, and reflection**: Quality of the critical commentary, reference to literature or discussion on the other possible methodologies. Limits imposed by different software etc. Reflection, etc. (35%)
4. **Communication and Overall Presentation**: Quality of writing and results. (10%)

**Part 3 – Mini-Research Project. 60% Equivalent 1800 words report/commentary (not including any code)**

For the final element of the assessment, you will combine the cartographic and GI Science skills you have learned over the 10 weeks of the course to showcase your abilities as a fully rounded spatial analyst. The focus here is on reproducibility and the transparency of your processes.

You will demonstrate that you are able to formulate a research objective, which may be:

* An answer to a defined research question (or questions) and testing a hypothesis,
* Developing / deploying a piece of software or a service
* To assist people in moving from raw data to knowledge, though processing some data and carrying out some appropriate analysis – this could be customisable.

Finished product could be:

* A Small piece of analysis addressing a question/hypothesis
* A Decision support tool (e.g. shiny app bringing different data together to support decision making or the understanding of data)
* New analysis/visualisation function or tool

This part of the assessment requires a good understanding of:

* The Scientific Method – Background research, defining problem, initial research questions/proposed framework and hypotheses/expected framework utility
* Stepping through the research problem and documenting in Markdown to explain:
  + Data cleaning/preparation
  + Descriptive analysis (if required)?
  + Off-the-shelf or custom-built analysis functions?
  + Justification of methodologies employed to answer questions
  + Display of results
  + Discussion/interpretation/commentary of results or end product
  + Conclusions/Critical evaluation of outcomes/potential impacts etc.

Part 3 is marked according to the following criteria:

1. **Background and Context**: Literature review and background on the significance and appropriateness of the objective(s), justification of the research idea/questions/objectives and the proposed workflow. context relating to the choice data types, software, methods, tools, packages, process and framework. (20%)
2. **Complexity**: Design, fitness-to-purpose, and (re)usability of the proposed workflow and methodologies to achieve the objectives of the research. The complexity of used tools, data access, and proposed techniques/framework (35%)
3. **Knowledge, understanding, and reflection**: Quality of the critical commentary, reference to related work and interpretation on the results, discussion on limitations and risks. (35%)
4. **Communication and Overall Presentation**: Quality of writing and the quality of maps, charts, diagrams, user-friendliness of the end product results (if applicable). (10%)