Information about the assignment

- Students were working in groups of 2 or 3. One person worked alone.
- The assignment should consist of maximum 5000 words and include a minimum of 5 and maximum of 10 figures (i.e. maps) and/or tables
- Students submitted a proposal in October. Their research topics have been approved and they got written comments/suggestions from the teachers.
- The assignment could be written in English, Norwegian, Swedish or Danish.
- In the course, students were introduced to using ArcGIS Pro and GeoDa. However, they were free to choose any other GIS program, or combination of programs to perform the group project.
- Each assignment should consist of the main parts (might be named differently and be in different order):
    - **Introduction** with a spatial research question(s), objectives and definition of the study area
    - **Theory** with references to relevant academic and non-academic literature
    - **Methods** applied in the project, including sources of data, tools and techniques used to collect, manage, convert and analyse data, reflections about errors, uncertainties and limitations, etc.
    - **Results** with maps and other figures and their interpretation / discussion
    - **Conclusion** with an answer to the spatial research question(s)

Grading criteria

1. <u>Answering the research question</u>
   The most important criterion is whether the group answered their spatial research question(s) in a convincing way using GIS analysis.

2. <u>Reflection</u>
   Another important criterion is acknowledging challenges, being reflective and self-critical. This is especially valuable when self-reflection shows that students have broadened their knowledge and acquired new skills. Acknowledging different ways of achieving the objectives and providing arguments for methodological choices should be rewarded.

3. <u>Cartography</u>
   What makes good and bad maps, and the different qualities of maps and other GIS outputs has been covered extensively in the course, therefore the visual communication of results should have a high importance in grading.

4. <u>Own data</u>
   Projects which included manual collection of own data and/or extensive conversions and adaptation of data to meet the objectives of the project should be rewarded.

5. <u>Tools and techniques</u>
   Projects, which utilized tools and techniques beyond what was covered in the course (see list below) should be rewarded. However, focusing on the classical tools and techniques covered in the course should not be a burden for receiving a good grade, as long as the spatial research question(s) have been answered.
   In the course, students have learned:

a. Importing vector and raster data to ArcGIS Pro
b. Cartography and basic techniques of symbolizing spatial data, including classification methods, normalization, transparency etc.
c. Projections, coordinate systems, georeferencing and how to deal with projection problems
d. Collection of point data using mobile applications (such as Google My Maps) in the field as well as converting and importing this data to ArcGIS Pro
e. Editing and creating vector data in ArcGIS Pro
f. Managing and "cleaning up" attribute data in both MS Excel and ArcGIS Pro, adding new fields, calculating fields, calculating geometry etc.
g. Joining Excel tables with shapefiles in ArcGIS
h. Definition query, selecting by location and selecting by attribute
i. Basic spatial analysis: buffer, clip, erase, converting polygons to points, etc.
j. Basic raster functions on elevation data: hillshade, aspects, slope and contour
k. Basic network analysis: service area and location-allocation
l. Spatial autocorrelation in GeoDa (not ArcGIS Pro): definition of distance weights (and neighbour rules), LISA maps, Moran's I test

Other considerations

Length and number of figures

The exact number of maps / figures and the world count should _not_ be important considerations in grading. ***Pay attention to the number of students in a group. Shorter assignments should be allowed for groups of two, without a significant loss of grade. One student was allowed to write the assignment alone and he/she should also be allowed to submit a shorter assignment without affecting his/her grade.***

Technical challenges

Because this semester for the first time ever the course was taught mainly digitally, there have been many technical challenges related to accessing the software, for example:

• Students had to work mainly from home, as access to computer rooms on campus was restricted. Most of the group meetings took place digitally.
• Some students did not have strong enough personal computers or fast internet connection which meant that ArcGIS Pro might have worked slow or crashed multiple times.
• ArcGIS Pro is not available for Mac computers and during some periods the remote desktop option (via Programkiosk) was unstable, crashed and caused delays.

The result was that most students ended up spending significantly more time fixing the problems as opposed to (or in addition to) developing their projects. Please be understandable and kind.