**HGO4940: revised course description and curriculum (9 Oct. 2018)**

**Course content**

This course explores in depth how Geographic Information Systems (GIS) can be used to study social processes. GIS has become an important tool, not only for planners and in risk assessment, but also in studies of society, the environment, and the interactions between them. ~~Through lectures, the students will learn about the fundamental components of GIS, and apply this knowledge in a series of hands-on seminars and an individual project.~~ In combined thematically oriented lecture-seminar sessions the students will learn and immediately apply fundamental knowledge components of GIS. The curriculum for each lecture-seminar session combines theory from text books, methodological book chapters or journal articles, and empirical journal articles where these methods are applied.

Spatial data is special data. In this course, the students will learn about the unique methodological aspects of spatial data which include collecting, managing, analysing and presenting such data and the respective results. A larger section of the course is devoted to spatial analytical methods and introducing the students to basic spatial econometrics, including spatial regression.

~~In addition, the course will introduce the students to qualitative GIS, an expanding tool in critical geographical research using bottom-up approaches and participatory information collection to study social processes.~~

The course will mainly use ESRI ArcGIS, ~~but open-source alternatives such as QuantumGIS and R will also be introduced, highlighting the diversity of available GIS software.~~ but students may also use open-source alternatives, such as GeoDa, QuantumGIS and R. Moreover, students learn to use GIS to prepare data for quantitative data analysis outside GIS, such as in SPSS or Stata.

**Learning outcome**

The students will learn about the fundamental components of a GIS, from the user and software side to the particular methods used to obtain information from spatial data. More specifically, this involves ~~distance measurements, spatial dependency and autocorrelation, spatial clustering, spatial interpolation and spatial regression methods~~, buffers and overlays, network analysis, GIS-based multicriteria assessment, spatial dependency and autocorrelation, spatial clustering and spatial regression methods.

~~The students will also learn how qualitative GIS can be used in social science research, both as an analytical tool and as an information collection tool in participatory GIS.~~

**Knowledge**

- Understand the special nature of spatial data and how they are different from non-spatial data.
- Learn about the key components of a GIS, including users, databases, software, and networks.
- Learn how we can collect and manage spatial data in both file formats and databases.
- Learn basic to advanced spatial analytical methods, including ~~interpolation and clustering~~ network analysis, spatial multicriteria assessment and clustering.
- ~~Learn about bottom-up GIS and participatory GIS.~~
- Learn ~~basic~~ visualization techniques and cartographic principles.

**Skills and competence**

- Develop skills to master GIS software ~~such as ArcGIS, QuantumGIS, and R~~.
- ~~Apply methods and techniques discussed in lectures in hands-on seminars.~~
- Learn, critically discuss, and directly apply spatial methods and techniques in combined lecture-seminar sessions.

- ~~Unite experience from lectures and seminars to~~ Complete a project where GIS will be used to study ~~a social phenomenon~~ socio-spatial phenomena on master level.
- Discuss sources of uncertainty and error in spatial data.
- Create data models used to answer specific spatial questions.

**Admission**

Students who are admitted to study programmes at UiO must each semester register which courses and exams they wish to sign up for in Studentweb.

If you are not already enrolled as a student at UiO, please see our information about admission requirements and procedures.

This course is a part of the Master's program in Human Geography. Students with admission to other relevant master's degree programmes can apply for admission as guest students.

Students with admission to the programme must each semester register which courses and examinations they wish to sign up for in StudentWeb.

**Prerequisites**

Formal prerequisite knowledge

SGO1910 – Geographical Information Systems (GIS) or similar introductory GIS courses must be approved upon application to the student advisor (by email). Basic understanding of computer systems recommended.

**Overlapping courses**

10 credits overlap with SGO4940 – Geographic Information Systems (Master level course) (continued)

**Teaching**

The teaching will consist of lectures and seminars.

In addition, the students will individually work on a larger project. The seminars will consist of hands-on lab exercises where each student will work on solving spatial questions using GIS. The seminars will also function as a project helpdesk, where the students can receive assistance with their ongoing project work.

~~Participation is mandatory in 80% of the seminars~~. Handing in weekly assignments is mandatory in 100% of the seminars.

Completed and approved compulsory course work is valid as long as the course is offered. Students who have failed to complete the compulsory attendance cannot take the exam.

**Access to teaching**

A student who has completed compulsory instruction and coursework and has had these approved, is not entitled to repeat that instruction and coursework. A student who has been admitted to a course, but who has not completed compulsory instruction and coursework or had these approved, is entitled to repeat that instruction and coursework, depending on available capacity.

**Examination**

~~Individual project report and oral examination.~~

Assessment of the course is based on an individual project report~~, adjusted through an oral examination centered on the project report~~.

**Submit assignments in Inspera**

You submit your assignment in the digital examination system Inspera. Read about how to submit your assignment.

**Use of sources and citation**

You should familiarize yourself with the rules that apply to the use of sources and citations. If you violate the rules, you may be suspected of cheating/attempted cheating.

**Language of examination**

You may write your examination paper in Norwegian, Swedish, Danish or English.

**Grading scale**

Grades are awarded on a scale from A to F, where A is the best grade and F is a fail. Read more about the grading system.

**Explanations and appeals**

It is recommended to request an explanation of your grade before you decide to appeal.

**Appeal**

- Appeal against grades
- Complaint about formal exam errors

**Explanation**

The deadline to request an explanation is one week after the grade is published. For oral and practical examinations, the deadline is immediately after you have received your grade.

The explanation should normally be given within two weeks after you have asked for it. The examiner decides whether the explanation is to be given in writing or verbally.

Ask for explanation of your grade in this course:

- home exam

If you want to appeal to the grade you were awarded, you should first request an explanation of the grade. If you submit an appeal, your project report will reassessed by two new examiners. The new examiners will not have access to the original grade or the original examiners' explanation of this. Please note that the grade from the appeal process is final, and the grade awarded may be the same as, better or worse than the original grade. Only if the assessment of the project report is changed, a new oral exam will be arranged.

**Resit an examination**

If you are sick or have another valid reason for not attending the regular exam, we offer a postponed exam later in the same semester.

See also our information about resitting an exam.

**Special examination arrangements**

Application form, deadline and requirements for special examination arrangements.

**Evaluation**

The course is subject to continuous evaluation. At regular intervals we also ask students to participate in a more comprehensive evaluation.

**Curriculum (total ~~703~~ 746 pages)**

**Books:**

Lloyd, C. D. (2010) *Spatial Data Analysis: An Introduction for GIS Users*. Oxford University Press (206p)

Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2011). *Geographic Information Science and Systems, fourth edition (2015)*. USA, John Wiley & Sons, Ltd. Ch. 1-5, 7-9, 11-16. (336p)

~~Cope, M., & Elwood, S. (Eds.). (2009). *Qualitative GIS: a mixed methods approach*. Sage. Ch. 1-5. (93 pages).~~

~~Smith, M. J., Goodchild, M. F. and Longley, P. A. (2013) "Geospatial Analysis-The comprehensive guide to principles, techniques and software tools". Free web version available.~~

**E-articles:**

@Anselin, L. (1995). Local indicators of spatial association—LISA. *Geographical analysis*, *27*(2), 93-115 (23p).

@Anselin, L., & Getis, A. (2010). Spatial statistical analysis and geographic information systems. In *Perspectives on Spatial Data Analysis* (pp. 35-47). Springer Berlin Heidelberg. (12p)

~~@Bott, M., & Young, G. (2012). The role of crowdsourcing for better governance in international development. *Praxis: The Fletcher Journal of Human Security*,*27*, 47-70. (23 pages)~~

~~@Gleditsch, K. S., & Weidmann, N. B. (2012). Richardson in the information age: Geographic information systems and spatial data in international studies. *Annual Review of Political Science*, *15*, 461-481. (20 pages)~~

@Golub, A., & Martens, K. (2014). Using principles of justice to assess the modal equity of regional transportation plans. *Journal of Transport Geography*, *41*, 10-20. (11 p)

@Goodchild, M. F. (2011). Scale in GIS: An overview. *Geomorphology*, *130*(1), 5-9 (4p)

~~@Goodchild, M. F. (2013). Prospects for a Space–Time GIS: Space–Time Integration in Geography and GIScience. *Annals of the Association of American Geographers*, *103*(5), 1072-1077. (5 pages)~~

@Goodchild, M. F. (2014). Twenty years of progress: GIScience in 2010. *Journal of Spatial Information Science*, (1), 3-20. (17p)

@Graziano, M., & Gillingham, K. (2014). Spatial patterns of solar photovoltaic system adoption: the influence of neighbors and the built environment. *Journal of Economic Geography*, *15*(4), 815-839 (25p).

@Helbich, M., Böcker, L., & Dijst, M. (2014). Geographic heterogeneity in cycling under various weather conditions: Evidence from Greater Rotterdam. *Journal of Transport Geography*, 38, 38-47 (10p).

@Meng, Y., & Malczewski, J. (2015). A GIS-based multicriteria decision making approach for evaluating accessibility to public parks in Calgary, Alberta. *Human Geographies*, *9*(1), 29-41 (13p).

@Orford, S. (2004). Identifying and comparing changes in the spatial concentrations of urban poverty and affluence: a case study of inner London. *Computers, Environment and Urban Systems*, *28*(6), 701-717. (17p)

@Salonen, M., & Toivonen, T. (2013). Modelling travel time in urban networks: comparable measures for private car and public transport. *Journal of transport Geography*, *31*, 143-153. (11p)

@Sánchez-Lozano, J. M., Teruel-Solano, J., Soto-Elvira, P. L., & García-Cascales, M. S. (2013). Geographical Information Systems (GIS) and Multi-Criteria Decision Making (MCDM) methods for the evaluation of solar farms locations: Case study in south-eastern Spain. *Renewable and Sustainable Energy Reviews*, *24*, 544-556. (13p)

@Singh, Y. J., Fard, P., Zuidgeest, M., Brussel, M., & van Maarseveen, M. (2014). Measuring transit oriented development: a spatial multi criteria assessment approach for the City Region Arnhem and Nijmegen. *Journal of Transport Geography*, 35, 130-143 (14p).

@Throndsen, T. (2017) Does the Urban Structure Mobility? A quantitative study of the effects of car ownership, and residential and destination locations on travel behaviour in Greater Oslo. MA-Thesis. University of Oslo. Ch. 3 (34p)

~~@Tollefsen, A. F., Strand, H., & Buhaug, H. (2012). PRIO-GRID: A unified spatial data structure. *Journal of Peace Research*, *49*(2), 363-374. (11 pages)~~

~~@Weidmann, N. B., & Ward, M. D. (2010). Predicting conflict in space and time.*Journal of Conflict Resolution*, *54*(6), 883-901 (8 pages)~~