The Hebrew University of Jerusalem

Syllabus

GIS applications for environmental history research - 40948

Last update 06-08-2015

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: geography

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Prof Noam Levin

Coordinator Email: noamlevin@mail.huji.ac.il

Coordinator Office Hours: Wednesday 10:00-11:00

Teaching Staff:
  Prof Noam Levin

Course/Module description:
  An advanced MA course in GIS, providing tools and knowledge for using historical maps in GIS to assess their accuracy, reconstruct past landscapes, and analyze landscape changes

Course/Module aims:
  The course aim is to give students experience and knowledge in the following themes:

Georeferencing ,maps, presenting RMSE

Evaluating the accuracy (geometric, attribute, temporal) and completeness of historical maps

Reconstructing past landscapes from historical maps - using manual and semi-automatic methods

Statistical methods to examine the correspondence between maps: overall accuracy, omission and commission errors, kappa index of agreements, further kappa indices developed by Pontius

Analyzing landscape changes using transformation matrices

Geocoding textual data

Time series analysis of historical data

Acquaintance with historical maps and aerial photos of Israel

Learning outcomes - On successful completion of this module, students should be able to:
  Georeference historical maps, evaluate the accuracy and completeness of historical maps, reconstruct historical landscapes from maps, examine landscape changes, analyze time series of historical data

Attendance requirements(%):

80

Teaching arrangement and method of instruction: Frontal lectures, practical work in GIS

Course/Module Content:
Environmental history, historical maps as tools for reconstructing past landscapes - sources of errors and spatial uncertainty

Projections and principles for georeferencing historical maps

Exercise: Georeferencing Jacotin's map

Reconstructing landscapes from historical maps

Exercise: Digitizing from a historical map and from an historical aerial photo

Examining the correspondence between maps using confusion matrices and calculating indices

Exercise: Examining the correspondence between maps using confusion matrices and calculating indices

Analyzing changes in time between maps, predicting changes, Markov chain analysis

Exercise:
Analyzing changes in time between maps

Time series analysis

Exercise: Analyzing changes in global land uses

Quantitative analysis of textual information and its spatial analysis

Exercise: quantitative analysis of textual information from the PDF Memoirs

Course overview and presentation of the final project

Required Reading:
Levin N. (2006) "The Palestine Exploration Fund map (1871–1877) of the Holy Land as a tool for analysing landscape changes: The coastal dunes of Israel as a case study" The Cartographic Journal, 43, pp. 45-67

Additional Reading Material:
  Gregory I.N. and Geddes A. (2014, eds.) Toward Spatial Humanities: Historical GIS and Spatial History. Indiana University Press: Bloomington.

Knowles A.K. (2008, ed.) Placing History: How GIS is changing historical scholarship. ESRI Press: Redlands CA. Digital supplement edited by A. Hillier.

Gregory I.N. and Ell P.S. (2007) Historical GIS: Techniques, methodologies and scholarship. Cambridge University Press: Cambridge.

Brown, D. G. (1998). Classification and boundary vagueness in mapping presettlement forest types. International Journal of Geographical Information Science, 12(2), 105-129.

Fisher, P. F. (1999). Models of uncertainty in spatial data. Geographical information systems, 1, 191-205.

Grossinger, R. M., Striplen, C. J., Askevold, R. A., Brewster, E., & Beller, E. E. (2007). Historical landscape ecology of an urbanized California valley: wetlands and woodlands in the Santa Clara Valley. Landscape Ecology, 22(1), 103-120.

Klein Goldewijk, K. , A. Beusen, M. de Vos and G. van Drecht (2011). The HYDE 3.1 spatially explicit database of human induced land use change over the past 12,000 years, Global Ecology and Biogeography20(1): 73-86. DOI: 10.1111/j.1466-8238.2010.00587.x.

Klein Goldewijk, K. , A. Beusen, and P. Janssen (2010). Long term dynamic modeling of global population and built-up area in a spatially explicit way, HYDE 3 .1. The Holocene20(4):565-573. http://dx.doi.org/10.1177/0959683609356587

Levin N. (2006) "The Palestine Exploration Fund map (1871–1877) of the Holy Land as a tool for analysing landscape changes: The coastal dunes of Israel as a case study" The Cartographic Journal, 43, pp. 45-67

Levin, N. (in press) "Human factors explain the majority of MODIS derived trends in vegetation cover in Israel - a densely populated country in the eastern Mediterranean". Regional Environmental Change, accepted July 23rd, 2015. doi: 10.1007/s10113-015-0848-4

Levin N., Elron E. and Gasith A. (2009) "Decline of wetland ecosystems in the coastal plain of Israel during the 20th century: Implications for wetland conservation and management" Landscape and Urban Planning, 92, pp. 220-232

Levin N., Kark R. and Galilee E. (2009) "Maps and the settlement of southern Palestine, 1799–1948: An historical/GIS analysis" Journal of Historical Geography,

30, pp. 1-21

Leyk, S., & Boesch, R. (2010). Colors of the past: color image segmentation in historical topographic maps based on homogeneity. GeoInformatica, 14(1), 1-21.

Leyk, S., Boesch, R., & Weibel, R. (2005). A Conceptual Framework for Uncertainty Investigation in Map-based Land Cover Change Modelling. Transactions in GIS, 9(3), 291-322.

Pontius, R. G. (2000). Quantification error versus location error in comparison of categorical maps. Photogrammetric Engineering and Remote Sensing, 66(8), 1011-1016.

Reuschel, A. K., & Hurni, L. (2011). Mapping literature: Visualisation of spatial uncertainty in fiction. The Cartographic Journal, 48(4), 293-308

Sanderson, E. W., & Brown, M. (2007). Mannahatta: An ecological first look at the Manhattan landscape prior to Henry Hudson. Northeastern Naturalist, 14(4), 545-570.

Schaffer, G., & Levin, N. (2014). Mapping Human Induced Landscape Changes in Israel Between the end of the 19Th Century and the Beginning of the 21Th Century. Journal of Landscape Ecology, 7(1), 110-145.

Schaffer, G., Levin, N. (in press) "Reconstructing 19th century landscapes from historical maps – the Survey of Western Palestine as a case study". Landscape Research, accepted May 26th 2015.

Schaffer, G., Peer, M., Levin, N. (in press) "Quantifying the completeness of and correspondence between two historical maps: a case study from 19th century Palestine". Cartography and Geographic Information Science, accepted February 9th, 2015. http://dx.doi.org/10.1080/15230406.2015.1029519

Tucci, M., & Giordano, A. (2011). Positional accuracy, positional uncertainty, and feature change detection in historical maps: Results of an experiment. Computers, Environment and Urban Systems, 35(6), 452-463.

Course/Module evaluation:
End of year written/oral examination 0 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 50 %
Assignments 50 %

Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

<u>*Additional information:*</u>
  We will use ARCGIS and Idrisi