



The Hebrew University of Jerusalem

Syllabus

Network analysis - 40892

Last update 09-11-2019

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: Geography

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Dr. Michal Lichter

Coordinator Email: Michal.Lichter@mail.huji.ac.il

Coordinator Office Hours:

Teaching Staff:

Dr. Michal Lichter

Course/Module description:

The course will review selected topics in network analysis with an emphasis on spatial applications in a GIS (Geographic Information System). In the course, students will learn to analyze real world data and use NetworkX and other python libraries.

course github repository:

https://github.com/mlichter2/network_analysis_huji

Course/Module aims:

Acquiring knowledge and skills to analyse networks

Learning outcomes - On successful completion of this module, students should be able to:

Describe what are networks and explain basic network theory concepts
Represent networks in different ways and describe the benefits and drawbacks of each
Analyse network using different python libraries
Characterise networks using various measures
Apply and perform various analyses on different types of networks

Attendance requirements(%):

80

Teaching arrangement and method of instruction:

Course/Module Content:

Introduction
General concepts
Network types
Paths
Depth First Search (DFS)
Breadth First Search (BFS)
Shortest path problem
Dijkstra
Network Properties

Distance measures
Clustering Coefficient
Connected Components
Social Networks and centrality and influence measures
Road and transportation networks and accessibility and connectivity measures
Route problems
Seven bridges of Königsberg
Traveling salesman problem Connectivity

Required Reading:

NetworkX:

<https://networkx.github.io/documentation/stable/index.html>

OSMnx:

<https://github.com/gboeing/osmnx>

<https://github.com/gboeing/osmnx-examples/tree/master/notebooks>

Gephi:

Home page:

<https://gephi.org/>

List of tutorials:

<https://seinecle.github.io/gephi-tutorials/>

Youtube lecture:

<https://www.youtube.com/watch?v&eq;2FqM4gKeNO4>

Python resources:

Graphs in Python:

https://www.python-course.eu/graphs_python.php

<https://www.python.org/doc/essays/graphs/>

DFS, BFS:

https://www.tutorialspoint.com/python/python_graph_algorithms.htm

General python:

<https://interactivepython.org/courselib/static/thinkcspy/index.html>

ArcGIS network analyst tutorial:

<https://desktop.arcgis.com/en/arcmap/latest/extensions/network-analyst/about-the-network-analyst-tutorial-exercises.htm>

Additional Reading Material:

<https://www.cs.cornell.edu/home/kleinber/networks-book/>

תורת הגרפים בעברית:

http://math-wiki.com/index.php?title&eq;%D7%AA%D7%A7%D7%A6%D7%99%D7%A8_%D7%AA%D7%95%D7%A8%D7%AA_%D7%94%D7%92%D7%A8%D7%A4%D7%99%D7%9D,_%D7%A1%D7%9E%D7%A1%D7%98%D7%A8_%D7%90_%D7%AA%D7%A9%D7%A2%D7%B4%D7%92

http://math.eitan.ac.il/graph_theory/Misc/home.htm

Course/Module evaluation:

End of year written/oral examination 0 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 100 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information:

course github repository:

https://github.com/mlichter2/network_analysis_huji