

**DETAILED COURSE PROGRAM****1<sup>st</sup> Semester**

No.	Code	Type (C/E)*	Course	ECTS Credits
1	EG01	C	Geographic Information Science	6
2	EG02	C	Remote Sensing and Digital Image Analysis	6
3	EG03	C	Geographic Modeling	6
4	EG04	C	Geospatial Programming in Computers	6
5	EG05	C	Research Methods	6
<b>Total Teaching Hours and ECTS</b>				<b>30</b>

\* C: Compulsory – E: Elective

**2<sup>nd</sup> Semester**

No.	Code	Type (C/E)*	Course	ECTS Credits
1	EG06	C	Special Applications of GIS	6
2	EG07	C	Spatial Statistics and Machine Learning	6
3	EG08	C	Applied Spatial Analysis	6
4	EG09	C	Big Geodata Analysis	6
5	EG10	C	Geodemography	6
<b>Total Teaching Hours and ECTS</b>				<b>30</b>

\* C: Compulsory – E: Elective

**3<sup>rd</sup> Semester**

No.	Code	Course	Course
1	EG11	Thesis	30

## EF01\_Geographic Information Science

▪ Semester: First    ▪ Type: Compulsory    ▪ ECTS Credits: 6

▪ *Instructor: Dimitrios Stathakis*

Geographical Information Science develops the introductory framework on Geographical Information Systems, and of the specifics of the analysis and handling of spatial information. The course includes spatial projections and coordinate systems, data structures, data bases, spatial queries, overlay of cartographic layers, geometry functions, map algebra, data integration and harmonization.

### Evaluation

Methods of evaluation:

- problem solving,
- multiple choice
- written work
- laboratory work

The evaluation criteria are clearly specified in the MSc regulation (article 4) which is accessible to the students.

### Indicative Bibliography

- Burrough P., McDonnell R., Lloyd C., 2015, Principles of Geographical Information Systems, 3rd Edition, Oxford University Press, pp. 352
- Chrisman N., 2006, Charting the unknown: how computer mapping at Harvard became GIS, ESRI Press, Redlands California, σελ 104-5. 112 – 122.
- Monmonier M., 1996, How to lie with maps, The University of Chicago Press, p. 139 – 145.
- Monmonier M., 1998, Cartographies of Danger: Mapping Hazards in America, University Of Chicago Press, pp. 378.
- Raper J., and D. Maguire, 1992, Design models and functionality in GIS, Computers and Geosciences, vol. 18, no. 4, pp. 387 – 394.
- Robinson A., Morrision J., Muehrcke P., Kimerling J. and S. Guptill, 1995, Elements of Cartography, Wiley, κεφ 15.
- Σταθάκης Δ., 2009, Σημειώσεις Συστημάτων Γεωγραφικών Πληροφοριών, ΠΘ, ΤΜΧΠΠΑ.
- Σταθάκης Δ., Περάκης Κ. και Ι. Φαρασλής, 2008. Διαχρονική ανάλυση χρήσεων γης με βάση τα δεδομένα του ευρωπαϊκού προγράμματος CORINE εξετάζοντας τον πίνακα αλλαγών, 5ο Πανελλήνιο Συνέδριο HellasGIS -Γεωγραφικά Συστήματα Πληροφοριών Περιβάλλον και Ανάπτυξη, Πολυτεχνειούπολη Ζωγράφου, 4 5 Δεκεμβρίου.
- Παρασχάκης Ι., Παπαδοπούλου Μ., και Π. Πατιάς, 1990, Αυτοματοποιημένη Χαρτογραφία, εκδόσεις Ζήτη.
- *Related academic journals:*
  - International Journal of Geographical Information Systems
  - IEEE Transactions in Geoscience and Remote Sensing
  - Computes, Environment and Urban Systems
  - Environment and Planning: B

## EG02\_Remote Sensing and Digital Image Analysis

▪ Semester: First    ▪ Type: Compulsory    ▪ ECTS Credits: 6

▪ *Instructor: Κουκούλας Σωτήριος*

The course emphasis is on the basic concepts of Remote Sensing and digital processing of satellite images. The syllabus of this course includes the following:

- Principles of Remote Sensing,
- Satellite and airborne sensors,
- Active and Passive sensors
- Principles of photointerpretation
- The nature of the digital image – satellite data
- Radiometric and geometric enhancement of digital images,
- Atmospheric correction
- Image Algebra, Vegetation Indices, Image filtering
- Multispectral classification of satellite imagery (unsupervised, supervised)
- Machine learning techniques for image classification
- Assessment of Classification Accuracy.
- Image fusion techniques

### Evaluation

Project based assignment (70%),

Exams (final/intermediate) (30%),

Evaluation criteria are described in the course's study guide (article 4)

### Indicative Bibliography

- Richards J.A. (2022). Remote Sensing Digital Image Analysis An Introduction. 6th Edition, Springer Berlin, Heidelberg. (διαθέσιμο μέσω της <https://link.springer.com/book/10.1007/978-3-030-82327-6>)
- Campbell J.B, Wynne R.H, and Thomas V.A. (2022). Introduction to Remote Sensing. 6<sup>th</sup> Edition, Guilford Press. ISBN 9781462549405.
- Congalton R.G. and Kass Green (2019). Assessing the Accuracy of Remotely Sensed Data Principles and Practices. 3<sup>rd</sup> Edition, CRC press
- Σκιάνης Α.Γ., Νικολακόπουλος Γ.Κ., Βαϊόπουλος Α.Δ. (2012). Τηλεπισκόπηση, Εκδόσεις ΙΩΝ. Αθήνα.
- Κάρταλης Κ., Φείδας Χ. (2012). Αρχές και Εφαρμογές Δορυφορικής Τηλεπισκόπησης. Εκδόσεις Τζιόλα.
- Mather P.M., & M. Koch (2010). Computer Processing of Remotely-Sensed Images: An Introduction. 4<sup>th</sup> Edition, Wiley and Sons. ISBN: 9780470666517 (διαθέσιμο μέσω της <https://onlinelibrary.wiley.com/doi/book/10.1002/9780470666517>).
- Neteler M., & H. Mitasova (2008). A GRASS GIS Approach. Springer New York, NY .
- Μερτίκας Σ. (2006). Τηλεπισκόπηση και Ψηφιακή Ανάλυση Εικόνας. Εκδόσεις Ίων, Αθήνα.
- *Related academic journals:*
  - Remote Sensing of Environment
  - International Journal of Remote Sensing
  - Photogrammetric Engineering and Remote Sensing
  - Remote Sensing Letters
  - Journal of Applied Earth Observation and Geoinformation
  - Remote Sensing
  - IEEE Transactions on Geoscience and Remote Sensing

- IEEE Applied Earth Observations and Remote Sensing
- IEEE Geoscience and Remote Sensing Letters
- GIScience & Remote Sensing
- Journal of Applied Remote Sensing
- Journal of the Indian Society of Remote Sensing
- - Egyptian Journal of Remote Sensing and Space Science

## EG03\_ Geographic Models

▪ Semester: First      ▪ Type: Compulsory      ▪ ECTS Credits: 6

▪ *Instructor: Apostolos Lagaras*

Issues related to geographical models are developed, with an emphasis on quantitative/mathematical models of urban space. The evolution of approaches and theoretical background is discussed. Key themes include land use models, population and activity location models, urban development and urban sprawl models, simulation models, and fractal geometry.

### Evaluation

The evaluation of students is based on the total of written assignments completed throughout the semester.

### Indicative Bibliography

- Abler R., Adams J.S., Gould P. (1971) *Spatial organization. The geographer's view of the world*. Englewood Cliffs, NJ: Prentice Hall.
- Alonso W. (1964) *Location and Land Use: Toward a General Theory of Land Rent*, Harvard University Press, Cambridge
- Αναστασιάδης Α. (1986) *Μαθηματικά μοντέλα του Αστικού χώρου*, University Studio Press
- Barredo J., Kasanko M., McCormick N., Lavalle C. (2003) Modelling dynamic spatial processes: simulation of urban future scenarios through cellular automata, *Landscape and Urban Planning*, 64: 145–160
- Batty M., Longley P. (1994) *Fractal cities: a geometry of form and function*. Academic press
- Batty M. (2005) *Cities and complexity: Understanding cities with Cellular Automata, Agent-Based models and Fractals*, MIT Press, Cambridge, Massachusetts, London, England
- Briassoulis H. (2000) *Analysis of Land Use Change: Theoretical and Modeling Approaches*, in Loveridge S. (Ed) *The Web book of Regional Science*, Regional Research Institute, West Virginia University, URL: <http://www.rri.wvu.edu/WebBook/Briassoulis/contents.htm>.
- Chorley, R.J. and Haggett, P. (eds) (1967) *Models in geography*. London: Methuen
- Haynes K., Fotheringham A. (1985) *Gravity and Spatial Interaction Models*, Regional Research Institute, West Virginia University
- Harvey D. (1969) *Explanation in Geography*, Edward Arnold Ltd, London
- Couclelis, H. (1999). Space, time, geography. *Geographical information systems*, 1, 29-38.
- Franchauser P. (1998) The Fractal Approach, a new tool for the spatial analysis of urban agglomerations, *Institut National d' Etudes Démographiques*, 10: 205-240
- Lagarias A. (2012) Urban sprawl simulation linking macro-scale processes to micro-dynamics through cellular automata, an application in Thessaloniki, Greece. *Applied Geography*, 34, 146-160.
- Lagarias A., Prastacos P. (2020) Comparing the urban form of South European cities using fractal dimensions, *Environment and Planning B: Urban Analytics and City Science*, vol.47 (7) <https://doi.org/10.1177/2399808318820911>
- Peet P. R., & Thrift, N. (2014) *New Models In Geography V2*. Routledge.
- Soja E. W. (2000) *Postmetropolis: critical studies of cities and regions*, Wiley-Blackwell

- Verburg P.H., Schot P.P., Dijst M.J., Veldkamp A. (2004a) Land use change modeling: current practice and research priorities, *Geojournal*, 61: 309-324
- White R., & Engelen G. (1993) Cellular automata and fractal urban form: a cellular modelling approach to the evolution of urban land-use patterns. *Environment and planning A*, 25(8), 1175-1199.
- *Related academic journals:*
  - Environment and Planning A
  - Environment and Planning B
  - Geografiska Annaler
  - Annals of the American Association of Geographers
  - [Cybergeo: European Journal of Geography](#)

## EG04\_Geospatial Programming

▪ Semester: First    ▪ Type: Compulsory    ▪ ECTS Credits: 6

▪ *Instructor: Leonidas Liakos*

Geospatial programming. Introduction to the main concepts and principles of computer programming. knowledge of data processing and analysis. Emphasis on geospatial data and its analysis through programming. Teaching of the following concepts/procedures, in Python language: values, types and variables. strings, lists, expressions, operators, tuples and dictionaries, flow control of execution, functions, reading and writing files, renaming, searching, copying, moving files and directories, reading csv files, processing and analyzing data with the pandas library, geoprocessing vector data with the geopandas library, charts using the seaborn library, reading, editing, geoprocessing raster data with the numpy library and rasterio.

### Evaluation

The assessment will be:

- a) 50% of individual exercises during the semester.
- b) 50% of final exams.

The evaluation will be based on the criteria of understanding and correct use of the concepts and techniques that will be taught to the students during the course.

The necessary assessment conditions (academic, legislative) will be applied to students with special educational needs.

Explicitly defined evaluation criteria are accessible by students in the Graduate Program regulation (Article 4).

### Indicative Bibliography

- Μανής, Γ., 2015. Εισαγωγή στον Προγραμματισμό με αρωγό τη γλώσσα Python. Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/2745>
- Καλαφατούδης Σ., Σταμούλης Γ., 2018. Προγραμματισμός με την Python, Αθήνα, Εκδόσεις Νέων Τεχνολογιών.
- Αγγελιδάκης, Ν., 2015. Εισαγωγή στον προγραμματισμό με την Python, Ηράκλειο. βιβλ.] Διαθέσιμο στο: [http://aggelid.mysch.gr/pythonbook/INTRODUCTION\\_TO\\_COMPUTER\\_PROGRAMMING\\_WITH\\_PYTHON.pdf](http://aggelid.mysch.gr/pythonbook/INTRODUCTION_TO_COMPUTER_PROGRAMMING_WITH_PYTHON.pdf)
- -Lawhead, J., 2019. Learning geospatial analysis with Python: understand GIS fundamentals and perform remote sensing data analysis using Python 3.7, Third edition. ed. Packt Publishing, Birmingham Mumbai.
- Βερούκιος Β., Καγκλής Β., Σταυρόπουλος Η., 2015. Η επιστήμη των δεδομένων μέσα από τη γλώσσα R, Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/2965>
- Καλογήρου, Σ., 2015. Χωρική ανάλυση. [ηλεκτρ. βιβλ.] Αθήνα:Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/5029>
- Ντζούφρας, Ι., Καρλής, Δ., 2015. Εισαγωγή στον προγραμματισμό και στη στατιστική ανάλυση με R. [ηλεκτρ. βιβλ.] Αθήνα:Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/2601>
- *Related academic journals:*
  - International Journal of Geographical Information Science, Taylor and Francis Ltd., (H-Index: 135), ISSN: 13658816, 13658824, <https://www.tandfonline.com/toc/tgis20/current>
  - ISPRS Journal of Photogrammetry and Remote Sensing/Elsevier B.V., (H-Index: 187), ISSN: 09242716, <https://www.journals.elsevier.com/isprs-journal-of-photogrammetry-and-remote-sensing>

## EG05\_Research Methods

▪ Semester: First    ▪ Type: Compulsory    ▪ ECTS Credits: 6

▪ *Instructor: Pavlos Baltas*

The basic concepts and methodology of empirical quantitative research are developed. The course covers the phases of designing and conducting a quantitative research project. From the formulation of research questions and literature review to the methods of data collection (from national and international databases or by creating a questionnaire), sampling procedures and data organisation and coding. A theoretical overview of the methods of data analysis is given, together with a presentation of the possibilities of visualisation - presentation of the research results and the formulation of research conclusions. Finally, the issues of academic ethics and research ethics are addressed.

### Evaluation

Valuation methods:

- Multiple-choice test,
- Write an assignment,

Explicitly defined assessment criteria are available to students in the MSc regulations (Article 4).

### Indicative Bibliography

- Babbie E. (2018) Εισαγωγή στην κοινωνική έρευνα, Εκδόσεις Κριτική.
- Bryman, A. (2017) Μέθοδοι Κοινωνικής Έρευνας, Εκδόσεις Gutenberg.
- Field, A., Miles, J., Field, Z. (2018) Ανακαλύπτοντας την Στατιστική με την Χρήση της R, Εκδόσεις Προπομπός.
- Καλογεράκη, Σ. (2020) Σχεδιασμός και κατασκευή ερωτηματολογίων στην κοινωνική έρευνα, Εκδόσεις Κριτική
- Schnell, R., Hill, P., Esser, E. (2014) Μέθοδοι Εμπειρικής Κοινωνικής Έρευνας, Εκδόσεις Προπομπός.

Related academic journals:

- Επιθεώρηση Κοινωνικών Ερευνών

## EG06\_Special Applications of GIS

▪ Semester: Second ▪ Type: Compulsory ▪ ECTS Credits: 6

▪ *Instructor: Dimitrios Stathakis, Aristotelis Bartholomeou, Serafim Polyzos, Olga Christopoulou*

This course focuses on more complex problems of analysis using spatial data and GIS. In specific, applications are presented focusing on visibility (viewshed) analysis, location allocation models, land use and land cover changes utilizing both raster and vector data structures, urban sprawl studies and models, GPS and GIS.

### Evaluation

Methods of evaluation:

- problem solving
- multiple choice
- written work
- laboratory work

The evaluation criteria are clearly specified in the MSc regulation (article 4) which is accessible to the students.

### Indicative Bibliography

- Stathakis D. and P. Baltas, 2024, The Greek model of urbanization, Land Use Policy, Vol. 140, 107113
- Rokos, D., Lolonis, P., and D. Stathakis, 2024, Real Estate Property and Cadaster: The Impact of New Mapping Techniques on Land Management and Planning in Greece. In: Darques, R., Sidiropoulos, G., Kalabokidis, K. (eds) The Geography of Greece. World Regional Geography Book Series. Springer, Cham.
- Pafi, M., Chalkias, C., & Stathakis, D. (2020). A cost-effective method for tranquility mapping using open environmental data. Environment and Planning B: Urban Analytics and City Science, 47(3), 417-436.
- Tselios V., and D. Stathakis, 2018, Exploring regional and urban clusters and patterns in Europe using satellite observed lighting, Environment and Planning B: Urban Analytics and City Science, accepted.
- Stathakis D and G. Tsilimigkas, 2015, Measuring the compactness of European medium-sized cities by spatial metrics based on fused data sets, International Journal of Image and Data Fusion, vol. 6, no. 1, pp. 42-64.
- Σταθάκης Δ., Χωροθέτηση ανεμογεννητριών ελαχιστοποιώντας την οπτική όχληση, ΑΕΙΧΩΡΟΣ, τευχος 19, σελ. 124-139.
- Σηφάκη Α., Σταθάκης Δ., και Ι. Φαρασλής, Evaluation των επιπτώσεων της δόμησης στο τοπίο της Κνωσού, ΑΕΙΧΩΡΟΣ, τευχος 19, σελ. 106-123.

Related academic journals:

- Computer, Environment and Urban Systems
- International Journal of Geographical Information Science
- IEEE Transactions on Geoscience and Remote Sensing
- IEEE Geoscience and Remote Sensing Letters
- Environment and Planning B

## EG07 \_ Spatial Statistics and Machine Learning

▪ Semester: Second ▪ Type: Compulsory ▪ ECTS Credits: 6

▪ *Instructor: Sotirios Koukoulas*

The course focuses on the methods of spatial statistics, machine and statistical learning. The three main subareas of spatial statistics are studied, namely Point Pattern Analysis, Analysis of Spatially Continuous Data and Analysis of Area Data, followed by machine learning methods for classification (learning with supervision) such as Decision Trees, Random Forests, Support Vector Machines and Neural Networks.

### Evaluation

3 assignments (100%)

Evaluation criteria are described in the course's study guide (article 4)

### Indicative Bibliography

- Bailey T.C. and Gatrell A.C. (1998). Interactive Spatial Data Analysis. Longman. ISBN 0-582-24493-5
- Diggle P.J. and Ribeiro P.J. (2007). Model-based Geostatistics. Springer. ISBN-10: 0-387-32907-2
- Hastie T. ,R Tibshirani & J. Friedman, (2009). The Elements of Statistical Learning Data Mining, Inference, and Prediction. 2<sup>nd</sup> Edition, Springer New York, NY. eBook ISBN 978-0-387-84858-7.
- Bivand R.S., Pebesma E. and Gómez-Rubio V. (2013). Applied Spatial Data Analysis with R. 2nd edition, Springer. ISBN 978-1-4614-7617-7
- Gareth J, D. Witten ,T. Hastie , R. Tibshirani, (2013). An Introduction to Statistical Learning with Applications in R. Springer. eBook ISBN 978-1-4614-7138-7.
- Chun Y. and Griffith D. A. (2013). Spatial Statistics & Geostatistics. Sage pubs
- Wood S. (2017). Generalized Additive Models An Introduction with R. 2nd Edition, CRC Press.
- Μπότσης Δ. και Διαμαντάρας Κ. (2019). Μηχανική μάθηση. Εκδόσεις Κλειδάριθμος.
- Ghatak A. (2019). Deep Learning with R. Springer. ISBN 978-981-13-5849-4
- Cresson R. (2020). Deep Learning for Remote Sensing Images with Open Source Software, CRC Press
- Φουσκάκης Δ. (2021). Ανάλυση δεδομένων με την χρήση της R. 2η έκδοση, Εκδόσεις Τσοτρας
- Oyana T.J. (2021). Spatial Analysis with R Statistics, Visualization, and Computational Methods. 2nd Edition, CRC press
- Μπερσίμης Σ., Μπάρτζης Γ., Παπαδάκης Γ. και Σαχλάς Α., (2024). Εφαρμοσμένη στατιστική και στατιστική μηχανική μάθηση με χρήση των IBM SPSS Statistics, R, Python. 2η Έκδοση, Εκδόσεις Τζιόλα. ISBN: 978-618-221-058-1
- Τσαγγαράτος Π. και Ηλία Ι. (2024). Μηχανική μάθηση και χωρική ανάλυση στις γεωεπιστήμες. Εκδόσεις Τζιόλα. ISBN: 978-618-221-045-1
- *Related academic journals:*
  - Computer, Environment and Urban Systems
  - Geographical Analysis
  - International Journal of Geographical Information Science
  - ISPRS International Journal of Geo-Information
  - Applied Geography
  - Environmental and Ecological Statistics
  - Mathematical Geosciences
  - Computers and Geosciences
  - Environmental Data Science
  - Journals in Geographical Information Systems

- Journal of Geographical Sciences
- Journal of Spatial Science
- Earth Science Informatics
- Transactions in GIS
- Environmental and Ecological Statistics
- Big Earth Data
- Remote Sensing of Environment
- International Journal of Remote Sensing
- Journal of Applied Earth Observation and Geoinformation
- Remote Sensing
- Computer Vision and Image Understanding
- International Journal of Data Science and Analytics
- IEEE Transactions on Geoscience and Remote Sensing
- IEEE Applied Earth Observations and Remote Sensing

## EF08\_Big Geodata Analysis

▪ Semester: Second ▪ Type: Compulsory ▪ ECTS Credits: 6

▪ *Instructor: Leonidas Liakos*

### Introduction

Presentation of the course and assessment procedure , review, install/setup software for writing code (Jupyter notebook or Visual Studio Code IDE)

Key characteristics and types of big data

Main features and necessity for cloud computing, types of geospatial cloud data: COG, STAC, Zarr, COPC, Geoparquet

Key sources of big data

Reference to the main sources of satellite data . Practical application: programmatically searching and visualizing satellite images on a cloud computing platform and through the Python programming language.

Cloud Computing Platforms

Reference to the main big data/cloud computing platforms (google earth engine, Copernicus Data Space, Wekeo), the Pangeo community, the main spatiotemporal data libraries. The Google Earth Engine (GEE) big data cloud platform, its satellite and geospatial data, the platform's geographic analysis capabilities.

The Python Programming Language

Fundamentals of the Python programming language, the geemap library: a client library for interacting with the google earth engine platform.

Geoprocessing of vector data

Reading vector data, metadata and properties, filtering, visualization, reprojection of coordinate reference system, mapping and reducing processes.

Geoprocessing raster data

Search and Read raster data, metadata, filtering, visualization, set mask/clip area, change values, reclassify, change projection system, mapping, reducing, compositing processes.

Big data analysis

Raster algebra, band statistics, frequency histogram, calculation of indices and time series charts.

Practical application/Presentation of semester assignments

Application of big data analysis through the demonstration of a real scenario, Presentation of the tasks.**Evaluation**

The assessment will be:

- a) 50% from individual exercises during the semester.
- b) 50% from final exams.

The evaluation will be based on the criteria of understanding and correct use of the concepts and techniques that will be taught to the students during the course.

The necessary assessment conditions (academic, legislative) will be applied to students with special educational needs.

Explicitly defined evaluation criteria are accessible by students in the Graduate Program regulation (Article 4).

### Indicative Bibliography

- Cardille, J.A., Crowley, M.A., Saah, D., Clinton, N.E. (Eds.), 2024. Cloud-Based Remote Sensing with Google Earth Engine: Fundamentals and Applications. Springer International Publishing, Cham. <https://doi.org/10.1007/978-3-031-26588-4>
- Chi, M., Plaza, A., Benediktsson, J.A., Sun, Z., Shen, J., Zhu, Y., 2016. Big Data for Remote Sensing: Challenges and Opportunities. Proc. IEEE 104, 2207–2219. <https://doi.org/10.1109/JPROC.2016.2598228>
- Liakos, L., Panagos, P., 2022. Challenges in the Geo-Processing of Big Soil Spatial Data. Land 11, 2287. <https://doi.org/10.3390/land11122287>
- *Related academic journals:*
  - Journal of Big Data/Springer Nature, (H-Index: 76), ISSN: 21961115, <https://journalofbigdata.springeropen.com/>
  - Big Data and Society/SAGE Publications Ltd, (H-Index: 69), ISSN: 20539517, <https://journals.sagepub.com/home/bdsa>

## EG09\_Applied Spatial Analysis

▪ Semester: Second ▪ Type: Compulsory ▪ ECTS Credits: 6

▪ *Instructor: Apostolos Lagaras*

Basic and advanced methods of spatial analysis are developed, along with their application in solving spatial and environmental problems (planning). The course includes issues related to the utilization of geospatial data, calculation of spatial indicators, and solving examples in a GIS environment, using real-world cases related to spatial planning.

### Evaluation

The evaluation of students is based on the total of written assignments completed throughout the semester (50% of the grade) and their oral examination on the exam day (50% of the grade).

### Indicative Bibliography

- Fotheringham S., Brunson Ch., Charlton M. (2000) Quantitative Geography: Perspectives on Spatial Data Analysis, Sage Publication.
- Lagarias A., Stratigea, A. (2021). High-Resolution Spatial Data Analysis for Monitoring Urban Sprawl in Coastal Zones: A Case Study in Crete Island. In: , et al. Computational Science and Its Applications – ICCSA 2021. ICCSA 2021. Lecture Notes in Computer Science(), vol 12958. Springer, Cham. [https://doi.org/10.1007/978-3-030-87016-4\\_6](https://doi.org/10.1007/978-3-030-87016-4_6)
- Lagarias A. Stratigea A. (2023) Coastalization Patterns in the Mediterranean: A Spatiotemporal Analysis of Coastal Urban Sprawl in Tourism Destination Areas, GeoJournal, 88, 2529–2552 (2023). <https://doi.org/10.1007/s10708-022-10756-8>
- Lagarias A. (2023). Impervious Land Expansion as a control-parameter for Climate Resilient Planning in the Mediterranean Coast: Evidence from Greece. Land 2023, 12(10), 1844; <https://doi.org/10.3390/land12101844>
- Καλογήρου, Σ., 2015. Χωρική ανάλυση. [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/5029>
- Unwin, D. (1981). Introductory Spatial Analysis. New York: Methuen
- *Related academic journals:*
  - Applied Geography
  - Landscape and Urban Planning
  - Environment and Planning A
  - Environment and Planning B
  - Geografiska Annaler
  - [Cybergeo: European Journal of Geography](#)

## EG10\_Geodemography

▪ Semester: Second ▪ Type: Compulsory ▪ ECTS Credits: 6

▪ *Instructor: Pavlos Baltas*

Focusing on the spatial dimension of demographic phenomena (fertility, migration and mortality) and based on the science of demography, the aim of this course is twofold: to highlight the spatial variations of demographic change (ageing, low fertility, reduction in household size, etc.) that are hidden behind national averages, and to analyse the relationship between the demographic evolution of a population and the spatial development or deprivation of a given spatial unit. Topics such as urbanisation, pre-urbanisation, rural exodus, etc. are dealt with using concrete examples and real data. The approach includes methods and cartographic visualisation techniques for the creation of thematic maps of demographic indicators and phenomena at a low spatial level. and processes and for the integration of knowledge from different fields.

### Evaluation

Valuation methods:

- Multiple-choice test,
- Write an assignment,

Explicitly defined assessment criteria are available to students in the MSc regulations (Article 4).

### Indicative Bibliography

- Bertin J. (1967), *Sémiologie graphique*, εκδ. Mouton Cauthier-Villars, Paris.
- Boyle, P., & Findlay, A. (2011). Exploring Population Analysis in Geography: Essays in Honour of Professor Robert Woods. *Population, Space and Place*, 17(5)
- Παπαδάκης Μ., Τσίμπος Κ., (2004), *Δημογραφική ανάλυση Αρχές, μέθοδοι, υποδείγματα, Σταμούλη*
- Preston, S. H., Heuveline, P., & Guillot, M. (2001). *Demography: Measuring and modeling population processes*. Blackwell Publishers.
- Raymer, J., Willekens, F., & Rogers, A. (2019). Spatial demography: A unifying core and agenda for further research. *Population, Space and Place*, 25(4), e2179
- Rogers, A. (2015). *Applied Multiregional Demography: Migration and Population Redistribution*. Springer International Publishing.
- Σιδηρόπουλος Γ. (2006) *Εισαγωγή στη γραφική σημειολογία Θεματική Χαρτογραφία*, Εκ. Παπαζήσης
- Ταπεινός, Γ. (1993) *Στοιχεία Δημογραφίας*, Εκδόσεις Παπαζήση
- *Related academic journals:*
  - Population, Space and Place
  - Spatial Demography
  - Demographic Research
  - Regional Studies.
  - European Journal of Population