

**Module Title: DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEMS**

• **Type of Module:**

ΓΕ0032	Elective
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• **Level of Module**

*Postgraduate*

• **Year of Study**

MASTER'S
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• **Semester**

Spring Semester 2 <sup>nd</sup> period
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• **Number of credits allocated**

3
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• **Name of lecturer / lecturers :** John Karkazis

• **Description:**

The basic aim of the course is to equip the students with the appropriate computational (Visual Basic) and algorithmic elements and techniques and the capability of simulative systems analysis to allow them to solve simple problems in the areas of logistics and electronic maps digitization and design .

• **Prerequisites:** Not applicable

• **Module Contents (Syllabus):**

PART A: INTRODUCTION TO VISUAL BASIC

PART B: THEORETICAL FOUNDATIONS

• **The basic map elements**

*-Physical and human-generated elements*

*-Urban centers*

*-Transportation networks*

*-Coastlines and iso-curves*

*-Scales*

• **Representation of spatial elements in maps**

*-Point type representations*

*-Linear and curve type representations*

*-The chromatic dimension of spatial elements*

• **Digital Maps and Geographic Information Systems**

*-Disadvantages of conventional maps*

*-The notion of the digital map*

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*-The notion of the Geographic Information System*

- **Digitization of map elements**

- Digitization methods for point type elements
- Digitization of linear and curve type elements
- Symbol digitization

- **Systems for organization of digitized information**

- The structural categories) organization system
- The organization system based on homogeneous structural elements

- **Digital maps design systems**

- Design of urban centers
- Design of transportation networks and iso-curves
- Design of symbols
- Color filling methods
- Conditional design

- **Methods of evaluation of basic spatial indices**

- Evaluation of path lengths
- Evaluation of areas

**PART C: APPLICATIONS**

- Development of a system for map digitization and design
- Development of a system for location of supply centers and evaluation of regional discrimination costs

**Language of instruction / Γλώσσα διδασκαλίας**

Greek

**Name and contact info of lecturer / Στοιχεία διδάσκοντα**

Name: John Karkazis

Position: Professor

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**Expected learning outcomes / Μαθησιακοί στόχοι**

**AIMS OF THE COURSE**

- To present and analyze the basic elements of Visual Basic as a tool of simulated design of complex spatial systems and their solution in a graphical and alphanumeric environment.
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- In the context of the above design/computational environment to present and analyze the basic principles/techniques of analysis and decomposition of a system in a series of basic elements and functions which can be recomposed in a variety of combinations and options.
- With respect to digitization and design of maps, special emphasis will be given to the creation of appropriate data bases (files), the exploitation of chromatic structures of system's elements and also to their decomposition via algebraic linearization methods and their recomposition via algorithmic (iterative) methods.
- With respect to the solution of locational and logistics problems, emphasis will be given to the organization and process of alphanumeric data, as for example development of sorting routines.
- Finally, with respect to the development of dynamic 3D images, emphasis will be given to the simulation of 'eye cognitive functions' via special picture boxes (pixel matrices) and special geometric methods which will project the (spatial) elements of visible space to the pixels of the 'simulated eye' and which will also create the sense of chromatic depth.

#### LEARNING OUTCOMES

At the end of lectures students should be able:

- to construct elementary Geographic Information Systems solving simple problems in the areas logistics and maps digitization and design.....

#### **Mode of delivery and teaching methods / Είδος μαθήματος και διδακτική μέθοδος**

Lectures with extensive use of Digital and Geographic Information Systems and analysis of Case Studies

#### **Compulsory & recommended reading / Υποχρεωτική & Συνιστώμενη βιβλιογραφία**

Compulsory reading from:

«Ποσοτικές Μέθοδοι III: Μεταφορές, Εμπόριο και Γεωγραφικά Συστήματα Πληροφοριών», Ι. Καρκαζή (εκδόσεις Πυξίδα) το οποίο είναι διαθέσιμο στην Βιβλιοθήκη.  
“Quantitative methods III: Transportation, Trade and Geographic Information Systems (Publisher: 'PYXIDA', Chios, Greece)

#### **Other teaching materials**

- “Geographic Information System Ptolemeos – Transport Turkey. Theoretical background, users guide and applications”, J.Karkazis

*Contents: logistics and regional efficiency (theory and users guide), strategic and risk analysis of transport networks (theory and users guide), applications (location of supply centers on Turkey's road network, security risk assessment of Turkey's road network)*

Όνομα αρχείου στα «Εγγραφα» (e-class): ‘GIS Transport Turkey’

-“Geographic Information System Regional Germany. Theoretical background, users guide and applications”, J.Karkazis

*Contents: supply centers (transport and operating) cost analysis, supply centers location, normalized supply costs (regional discrimination costs), regional marginal price, location of*

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*multiple centers, applications (the geo-economic dynamics of Germany, optimal location of single, dual and triple supply centers in Germany's main road network)*

Όνομα αρχείου στα «Έγγραφα» (e-class): 'GIS Regional Germany'

- “Geographic Information System Regional Europe. Theoretical background, users guide and applications”, J.Karkazis

*Contents: supply centers (transport and operating) cost analysis, supply centers location, normalized supply costs (regional discrimination costs), regional marginal price, location of multiple centers, applications (the comparative geo-economic profile of the German regions in the context of Europe)*

Όνομα αρχείου στα «Έγγραφα» (e-class): 'GIS Regional Europe'

- “Digital Information System Ptolemeos – Mathematica”, J.Karkazis

*(επιλύει απλά προβλήματα Γραμμικού Προγραμματισμού και πραγματοποιεί ανάλυση ευασθησίας)*

Όνομα αρχείου στα «Έγγραφα» (e-class): 'DIS Mathematica'

-“Ψηφιακό Υπολογιστικό Σύστημα ‘Πτολεμαίος – Logistics’”, Ι.Καρκαζής

*(επιλύει σύνθετα προβλήματα ελέγχου αποθεμάτων και logistics)*

Όνομα αρχείου στα «Έγγραφα» (e-class): 'DIS Logistics'

**Assessment methods & criteria / Μέθοδος & κριτήρια αξιολόγησης**

Submission of a series of reports and oral examinations

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