Course Title	Building Environmental Design Tools – Geographic information system				
Course Code	MEEB 506				
Course Type	Elective				
Level	Masters (2nd Level)				
Year / Semester	1st year/ 2nd semester or 2nd year/ 3rd semester				
Teacher's Name	Dr. Gregoris Kalnis, Dr. Byron Ioannou				
ECTS	10	Lectures / week	1	Laboratories/week	2
Course Purpose	The aim of the course is to introduce the students to the theory and concepts of Geographic Information Systems. In addition, to deepen in practical applications of GIS related to Energy Engineering. The course also aims to introduce the students to applications of climatic simulation of the built environment.				
Learning Outcomes	By the end of the course, students must be able to: 1. Analyze the concept of Geographic Information Systems (GIS) and its role for the sustainability in the built environment 2. Analyze the fundamentals of cartography and spatial analysis and recognize the basic terminology used for geographic information systems (GIS) 3. Comprehend the basic structure, interface and tools of GIS software as ArcGIS 4. Apply the principles of GIS software for simple sustainability and environmental risk assessments 5. Inform about Urban Heat Island Effect and Digital Assessment Tools as Envimet,				
Prerequisites	MEE520			Corequisites	None
Course Content	**1. Introduction to GIS and a brief history of GIS development.** - Introduction to GIS basic principles: layers, features and surfaces. - Overview of ArcGIS platform, ArcGIS for Desktop applications, ArcGIS extensions. **2. ArcMap 10.6 interface.** - Interact with maps, work with map layers, explore feature layer attribute tables - ArcCatalog 10.6 interface, interact with data, preview geographic and tabular (attribute) data, differentiate data types, search for data, explore metadata, understand data view and layout view				

	- ArcGIS Online, create a web map, search for shared online data, share a map package **3. Geographic coordinate systems** - Projected coordinate systems, projecting data, georeferencing a raster - Symbolizing features, symbolizing raster, create custom symbology, classifying features, presenting maps, create effective map layouts, add title, additional text and other map elements on layout, printing a map **4. Create a new file geodatabase, create feature classes, draw features, digitize** - Editing features, delete, split, merge features, editing feature attribute values - Querying data, select by attribute, select by location **5. Assessment of the energy performance of the built environment: Envimet 4** - Introduction - Alber, Biomet, Database Manager, Headquarter, Leonardo, Project Wizard - Envimet 4: Laboratory - Assesment and discussion on Exercise
Teaching Methodology	For the theoretical part of the course, the course will be presented through theoretical lectures in class. The lectures will present to the student the course content and allow for questions. The material will be delivered using visual aids (e.g. PowerPoint presentation slides, documentaries). The aim is to familiarize the student with the material at a faster pace of presentation, while allowing the instructor to use the presented material for meaningful discussions. The learning process will be enhanced with the requirement from the student to carry in-class discussions and tackling of hypothetical scenarios in small-group exercises. In-class case-studies are an integral part of this course. Homework assignments / mini projects, which will be required as part of the students' assessment for the course, will allow students the opportunity to carry out independent research, synthesize basic concepts presented in class, as well as hone their analytical, writing and presentation skills.

	For the laboratorial part of the course, the students will attend on a weekly basis lectures in Frederick's computer labs and will be educated to become proficient users of a GIS software tool (ArcGIS). Students will attend one to one teaching, face-to-face collaboration with teachers and fellow students, group reviews and final evaluations of project work. Besides from the notes taken by students in class, all of the course material will be made available through the class website which will be available through the University's E-learning platform. The instructor will be available to students during office hours or by appointment in order to provide necessary guidance.
Bibliography	Textbook: 1. Pucha-Cofrep, F., Fries, A., Cánovas-García, F., Oñate-Valdivieso, F., González-Jaramillo, V., & Pucha-Cofrep, D. (2018). Fundamentals of GIS: Applications with ArcGIS. Franz Pucha Cofrep. 2. Prasad, N., Ranghieri, F., Shah, F., Trohanis, Z., Kessler, E., & Sinha, R. (2008). Climate resilient cities: A primer on reducing vulnerabilities to disasters. The World Bank. References 1. Hillier, A. (2011). Manual for working with ArcGIS 10. University of Pennsylvania 2. Harder, C., & Brown, C. (2017). The ArcGIS Book: 10 Big Ideas about Applying the Science of where. Esri Press. 3. ESRI Arc GIS user's manual 4. ENVIMET online user's manual
Assessment	Students will be assessed through: - Scheduled interim evaluations of student progress. - A final exam The weights of the course assessment are as follows: Projects 50% Final Exam 50%
Language	English