The Hashemite University
Faculty of Engineering
Civil Engineering Program
Course Syllabus

Course Title:	Geographic Information System (GIS)	**Course Number:**	110401566
Department:	Civil Engineering	**Designation:**	Major Elective
Prerequisite(s):	110401365 & 110401369 and student familiarity with Microsoft Office Suite (Word, Excel, PowerPoint), online learning platforms Internet browsing		
Instructor:	Faculty Member	**Instructor's Office:**	
Instructor's e-mail:			
Office Hours:			
Time:		**Class Room:**	
Course description:	This course focuses on learning the basics and principles of GIS. The course presents a thorough introduction to GIS technology and linkage with map principles. It emphasizes on how spatial data can be organized, manipulated, analyzed and displayed, traditionally represented in maps, tables and aerial photographs. The course will focus on how the digital data layers are input and analyzed using GIS. Application of GIS in civil engineering.		
Textbook(s):	**Getting to Know ArcGIS** (4th Edition), Michael Law, Amy Collins Publisher: ESRI Press (July 2015, © 2015) ISBN-13: 978-1589483828; ISBN-10: 1589483820		
Other required material:	**Geographic Information Systems and Science** (4th Edition). Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind Publisher: Wiley (March 2015, ©2016) ISBN-13: 978-1118676950; ISBN-10: 1118676955		

Program Learning Outcomes (PLOs)

successful completion of this program graduates will be able to:

#	Outcome Description	Contribution
	General Engineering Student Outcomes	
a	an ability to apply knowledge of mathematics, science, and engineering.	M (20%)
b	an ability to design and conduct experiments, as well as to analyze and interpret data	H (30%)
c	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
d	an ability to function on multidisciplinary teams	
e	an ability to identify, formulate, and solve engineering problems	
f	an understanding of professional and ethical responsibility	
g	an ability to communicate effectively	
h	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
i	a recognition of the need for, and an ability to engage in life-long learning	L (10%)
j	a knowledge of contemporary issues	L (10%)
k	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	H (30%)

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	H=High, **M**= Medium, **L**=Low
Course Learning Outcomes (CLOs):	Upon completion of this course, the student will be able to: 6- Understand the concepts and components of a geographic information system (GIS). (a) 7- Operate a functional GIS through the use of ArcGIS software package (a, b). 8- Understand the operational processes of spatial data acquisition, editing and QA/QC, metadata development, geodatabase design, spatial query and display, spatial analysis and modeling, preliminary GIS application development, cartographic mapping and dynamic visualization.(b, k?) 9- Implement GIS basics in civil engineering applications and present it (h, k). 10- Recognize Google Earth and common open source GIS tools, as well as the basic concepts of remote sensing and Global Positioning System (GPS)(i, j).
Topics covered:	

Topics	No. of Weeks	Contact hours*
Introduction, course overview, what is GIS. Lab 1: ArcGIS basics, loading data, scales, navigation, online help	1	3
Cartographic principles and conventions. Lab 2: Making map	1	3
Spatial data properties and structure. Lab 3: Attribute query, joining and relating, projection	1	3
Spatial data management, geodatabase basics. Lab 4: Create feature classes, vector data editing, geocoding	1	3
Vector based spatial analysis. Lab 5: Location query, overlay and adjacency analyses	1	3
Raster based spatial analysis. Map algebra, surface analysis. Lab 6: raster-vector conversion, geo-referencing	1	3
Spatial statistics and geo-statistics. Lab 7: Spatial dependency, clustering, fragmentation, interpolation	1	3
Mid Term Exam. **Planning for final project (application of GIS in civil engineering applications)**	1	3
Data collection and data quality/. Lab 8: collect data for final project, develop metadata	1	3
Network analysis. Lab 9: test, select and document analytical methods for final project.	1	3
GIS modeling and automation; web GIS and open source GIS. Lab 10: conduct analysis	1	3
Introduction to Remote Sensing. Lab 11: explore visualization options, create visual outputs for final project.	1	3
Global Positioning Systems. Lab 12: prepare final project presentation (PowerPoint, PDF or other visual aid, 8-10 minutes/student)	2	6
Geospatial applications and perspectives. Lab 13: compose final project poster	1	3
Project Oral Presentation.	1	3
Total	**15**	**45**

*Contact hours include lectures, Labs, and exams

Class/laboratory schedule:	1 class sessions (50 mi.) and 2 hours Lab.

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Grading Plan:	Midterm Exam	(30 Points)	
	project	(30 Points)	
	Final Exam	(40 Points)	Will be announced by the registrar
	The grading system that will be used for this class will be as follows		A+(90-100), A (86 -89), A- (82-85), B+ (78-81), B(74-77), B-(70-73), C+ (66-69), C (62-65), C-(58-61), D+ (54-57), D(50-53).
General Notes:	• The maximum allowed number of absentees from the course is five classes. Exceeding these limits will lead to prevention from attending the final exam. • NO MAKE-UP EXAMS. • Beware of Plagiarism: copying and handing in for credit someone else's work. Any plagiarism case will result in an automatic 'F' for the course		