Course title: Geospatial databases and data integrations

Course Basic Information	
Academic Unit:	Faculty of Civil Engineering and Architecture
Course title:	Geospatial databases and data integrations
Level:	MA
Course Status:	Mandatory
Year of Study:	Year 1, semester 1
Number of Classes per Week:	2+2
ECTS Credits:	6 ECTS
Time /Location:	According to the Timetable
Teacher:	Prof.Dr. Ismail Kabashi
Contact Details:	ismail.kabashi@uni-pr.edu + 383 44 325 819
Course Description:	Geospatial databases and data integration is a very important subject in the Geodesy study program. GIS systems have taken on a role in almost every sector of society in nowadays and every GIS system depends largely on the structure of the database which must be designed in such a way as to provide efficient storage of spatial data.
Course Goals:	This course focuses on the design and development of spatial databases. Importance will also be given to data modeling techniques to design a database for a given application.
Expected Learning Outcomes:	Upon completion of the course students will: - Be familiar with the principles and basic techniques for designing a functional database and their application as in the geospatial database. - Students will be able to apply these principles and techniques in designing and building geospatial databases. - Will use GDBMS for storage, management and various spatial analysis. - Students will be trained in the basic use of operations of SQL, PostrgeSQL/PostGIS and open-source. - Students will gain new knowledge about world trends in the field of databases (network data model, spatio-temporal data model).

Student Workload (should be in compliance with student's Learning Outcomes)			
Activity	**Hours**	**Day/ Week**	**Total**
Lectures	2	15	30
Theory/ Lab Work/Exercises			

Practical Work			
Consultations with the teacher	2	15	30
Field Work			
Test, seminar paper	3	4	12
Homework	1	10	10
Self-study (library or home)	2	15	30
Preparation for final exam	8	2	16
Assessment time (test, quiz, final exam)	3	2	6
Projects, presentations, etc.	8	2	16
Total			**150**

Teaching Methods:	- Lecture - Discussion during lectures - Exercises - Work in group
Assessment Methods:	In evaluation, the percentage of the attendance of each partial evaluation in the final evaluation must be determined. One of the ways of evaluation would be: First valuation: 25% Second Valuation: 25% Homework: 10% Attendance: 10% Final Exam: 30% Total: 100%
Primary Literature:	*1) P. Rigaux, M. Scholl and A. Voisard (2002): Spatial Databases with applications to GIS, Morgan Kaufmann* *2) Albert K. W. Yeung & G. Brent Hall (2007): Spatial Database Systems: Design, Implementation and Project Management* 3) *Kang-TSUNG Chang (2019): Introduction to Geographic Information Systems, Ninth Edition*
Additional Literature:	1) Leo S. Hsu & Regina O. Obe (2021): PostGIS in Action, Third Edition 2) https://postgis.net/docs/manual-3.2/ 3) https://www.postgis.net/workshops/postgis-intro/ 4) https://www.postgresql.org/docs/current/

Designed teaching plan	
Week	**Title of the Lecture**
Week 1:	Introduction in GDBMS and General principles of data modeling
Week 2:	Spatial data type; Identifying spatial objects; Entity relationship modeling; Vector features (points, lines, polygons) and associated attributes; Vector features and associated topology)
***Week 3*:**	Fields: continuous and discrete raster representation
Week 4:	SQL- Spatial queries (Queries and Subqueries, Joining Tables,

	Aggregating Data)
Week 5:	Spatial reference system in Spatial databases
***Week 6*:**	Standards in spatial data
Week 7:	Functions for managing geometric and geographic data in GDBMS
Week 8:	Raster Data Management, Queries in spatial database
Week 9:	Topological model – DE-9IM and topology rules
Week 10:	Spatial Access Methods - Indexing (Quadtree, R-tree, K-d tree, BSP tree, Grid file)
***Week 11*:**	Spatial data accuracy and quality
***Week 12*:**	Geocoding and network analysis
***Week 13*:**	3D and Spatio-temporal data
***Week 14*:**	Storing and uses of LIDAR (point cloud) in spatial database
***Week 15*:**	Security, versioning and auditing of spatial data

Academic Policies and Code of Conduct
We start and finish class on time. *Tools used during class must be cleaned and stored away at the end of class.* *Mobile/smart phones, and other electronic devices (e.g. iPods) must be turned off (or on vibrate) and hidden from view during class time.* *Laptop and tablet computers are allowed for quiet use only; other activities such as checking personal e-mail or browsing the Internet are prohibited.*

Note | If a student has more than 3 class assignements evaluated below 50% he/she loses the right on taking the final exam. Evaluation is done from 0-100 %.