

## CE 263N Scalable Spatial Analytics

### Sample Syllabus

#### Prerequisites

No formal prerequisites. (an undergraduate degree in engineering domain is expected, with knowledge of linear algebra and statistics, as well as some programming experience)

**Primary goal:** Provide theoretical background and hands-on experience in predictive modelling for designing scalable data-driven systems and location-based services based on data analytics.

**Short Description:** Introduction to modern methods of data analysis, spatial data handling and visualization technologies for engineers and data scientists. Theoretical coverage includes a selection of methods from spatial statistics, exploratory data analysis, spatial data mining, discriminative and generative approaches of machine learning. Projects and assignment tasks are targeted at real-world scalable implementation of systems and services based on data analytics in environmental remote sensing, transportation, energy, location-based services and the domain of “smart cities” in general.

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#### Course Reader

The course readings are available on bCourses as pdf files and/or links to online materials.

#### Course Grading

1 or 2 Midterms	30%
Homework (6 problems)	50%
Final Project	20%

## Course Schedule

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LECTURE	DATE	TOPIC	THEME	PROBLEMS DUE
1		Introduction	General	
2		Exploratory data analysis	EDA	
3		Clustering	EDA	
4		Dimensionality reduction	EDA	
5		Spatial databases I	Data Handling	
6		Spatial databases II	Data Handling	
7		GIS and web mapping	Data Handling	
8		Trajectories and map matching	Data Processing	
9		Map matching and reconstruction	Data Processing	
10		Point Pattern Analysis	Spatial Statistics	
11		Geostatistics	Spatial Statistics	
12		Spatial Regression	Spatial Statistics	
13		Geographically weighted models	Spatial Statistics	
14		Intro to ML, model selection	ML discriminative	
15		Locally linear models	ML discriminative	
16		Kernel methods I, SVM	ML discriminative	
17		Kernel methods II, SVR	ML discriminative	
18		Elements of computer vision	ML discriminative	
19		Mixture models, EM	ML generative	
20		MC, HMM, CRF	ML generative	
21		Spatial PLSA/LDA	ML generative	
22		Recommender Systems	ML generative	
23		Complex networks	Complex Systems	
24		Agent-based models	Complex Systems	
25		Catch-up	General	
26		Final projects	General	
27		Final projects	General	

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