Syllabus

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Course objectives. By the end of this course, students will be able to:

(i) Wrangle (i.e. clean and manipulate) large, messy data sets into forms suitable for modeling and analysis (in particular, optimization, simulation, and statistical models).

(ii) Create sophisticated visualizations of large data sets that provide useful insights for decision-making as well as further modeling and analysis.

Textbook. There is no required textbook for this course. You will be provided with lesson notes and links to supplementary readings throughout the semester.

Schedule. Here is a *very* tentative schedule.

Week	Topics
	Warm up
1	A very brief introduction to Pandas Method chaining
	Data visualization with Altair
2	Altair basics: data types, encoding channels, graphical marks
3	Basic data transformations: binning and counting, aggregation Advanced data transformations: calculate, filter, window
4	Basic top-level chart configuration Scales: axes, colors Advanced top-level chart configuration
5	Multi-view composition: layers, concatenation, facets
6	Review **Exam 1**
7	Interactive visualizations: tooltips Interactive visualizations: dynamic queries
8	Cartographic visualization: geoshape marks, point maps, symbol maps, chloropleth maps, lookup transforms
	Data wrangling with Pandas
	Brief Python review: functions and lambda functions; classes, methods, and attributes; for loops; f-strings
9	The Series and DataFrame objects Basic arithmetic operations on Series and DataFrame objects, broadcasting Applying functions to Series and DataFrame objects

Week	Topics
10	Selecting and dropping data Adding new columns Dealing with missing data
11	Grouped operations: split-apply-combine Tidy data: long vs. wide data, reshaping, pivoting
12	Review **Exam 2**
13	Relational data: merge, join, and concatenate Dealing with dates and times Dealing with strings
Additional topics	
14	Scraping data Passing data between R and Python
15	Review or additional topics
16	Review or additional topics
17	Review or additional topics