Course Syllabus

COURSE OUTLINE
URBPLAN - 740: Data Analysis Methods I
Spring 2011

Lecture Time: Tuesday 5:30-8:10 pm
Lecture Room: AUP 191
Lab: AUP 194
Instructor: Rich Shaker
Teaching Assistant: Michael Kavalar
E-mail: rrshaker@uwm.edu
E-mail: mkavalar@uwm.edu
Telephone: (414) 861-7419 (cell)
Office: AUP 212
Webnotes: D2L
Office Hours: Wed. 10:00 am -12:00 noon; (Bolton Hall, room 444), or by appointment

OVERVIEW
Planners use numbers and planners use quantitative reasoning in their day-to-day activities. The overarching goal of this class is to make sure that each and every student is comfortable and skilled at using quantitative information and sound reasoning to address problems and questions they encounter in planning, architecture, design, and policy-making scenarios. This course is designed to familiarize the student with the collection of statistical techniques of data commonly found in planning practice. The intent of the course is to provide opportunity for the definition, conceptualization, design and implementation of research and analysis, with emphasis on the latter. The planning methods covered in this course are generally applicable to planning problems in more than one field of study and can be considered basic tools for most planning analyses.

COURSE REQUIREMENTS & GRADING

- Assignment #1: 22 February 2011 15%
- Assignment #2: 29 March 2011 15%
- Final Project Proposal & Presentation: 5 April 2011 10%
- Mid-Term Examination: 12 April 2011 30%
- Final Project: 10 May 2011 20%
- Participation & Attendance: 10%

Late Penalty: 2% per weekday (not including weekend days). Late assignments should be submitted to my mailbox on the 4th floor of Bolton Hall or the Urban Planning Department main office.

Assignments should be word processed, and written in a formal report format (to be discussed in class). Retain a copy of all rough notes and final products until the assignments have been marked and returned to you, as you may be asked to produce them.

REQUIRED READINGS:
- “SPSS Statistics 17.0: Guide to Data Analysis.” by: Marija J. Norusis
- Relevant readings will be available on electronic reserve and/or D2L. Some readings are yet to be determined (TBD).

LECTURE NOTES:
- Lecture presentations and readings will be available on the D2L website. Please read these materials prior to class.
OTHER NOTES:

• The Secretary of the University maintains a web page that contains university policies that affect the instructor and the students in this course, as well as essential information specific to conduct of the course. The link to that web page is: http://www4.uwm.edu/acad_aff/policy/academicmisconduct.cfm

• **Students with disabilities.** Verification of disability, class standards, the policy on the use of alternate material and test accommodations can be found at the following: http://www4.uwm.edu/sac/

• **Religious observances.** Policies regarding accommodations for absences due to religious observance are found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S1.5.htm

• **Students called to active military duty.** Accommodations for absences due to call-up of reserves to active military duty are found at the following: http://www4.uwm.edu/current_students/military_call_up.cfm

• **Incompletes.** You may be given an incomplete if you have carried a course successfully until near the end of the semester but, because of illness or other unusual and substantiated causes beyond your control, have been unable to take or complete the final examination or to complete some limited amount of course work. An incomplete is not given unless you prove to the instructor that you were prevented from completing the course for just cause as indicated above.
  - The conditions for awarding an incomplete to graduate and undergraduate students can be found at the following: http://www4.uwm.edu/current_students/records_grades/grades.cfm

• **Discriminatory conduct.** (such as sexual harassment). Discriminatory conduct will not be tolerated by the University. It poisons the work and learning environment of the University and threatens the careers, educational experience and well-being of students, faculty and staff. Policies regarding discriminatory conduct can be found at: http://www4.uwm.edu/ugcatalog/AdminPol.html

• **Academic misconduct.** Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Policies for addressing students cheating on exams or plagiarism can be found at the following: http://www4.uwm.edu/acad_aff/policy/academicmisconduct.cfm

• **Complaint procedures.** Students may direct complaints to the Associate Dean for Social Sciences in the College of Letters & Sciences. If the complaint allegedly violates a specific university policy, it may be directed to the Associate Dean for Social Sciences in the College of Letters & Sciences, or to the appropriate university office responsible for enforcing the policy. Policies may be found at: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S49.7.htm

• **Grade appeal procedures.** Procedures for student grade appeal can be found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S28.htm

• **Final examination policy.** Policies regarding final examinations can be found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S22.htm

**TENTATIVE CLASS SCHEDULE**

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<td>• Course overview; epistemological foundations; math review</td>
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<td>Feb.</td>
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<td>2</td>
<td>What’s in a Number?, Basic Numeracy, Measurement</td>
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<td>Variables, Samples and Population: Measures of Central Tendency</td>
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<td>• Reading: [Meier] Chapters 4 and 5; &quot;Remembering a Snowstorm that Paralyzed the City.&quot; New York Times, February 10, 2009.</td>
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ASSIGNMENT #1: OPERATIONALIZING THE PLANNING CONCEPT (DUE 22 FEBRUARY 2011)

1. THE PROBLEM OF MEASUREMENT AND PERCEPTION:
In class and in the readings we have struggled with the fact that the information used by planners, social science researchers, and policy-makers is not drawn from unbiased and naturally-occurring “data sources,” but rather comes into existence through conscious and deliberate acts of measurement. The world may be full of a staggering array of things and phenomena in various shapes, sizes, distributions, and relationships that can all...
be measured, but there is no single objective way to catalogue and categorize it all without introducing a whole host of assumptions, perspectives, and biases.

From the point of view of philosophy, this “problem of perception” presents one of the stickiest challenges of epistemology- a troubling issue that has never been satisfactorily resolved by the empiricists, despite some valiant attempts. For us, being more “realistic” in our approach, we can put aside some of the thornier philosophical concerns, but must still be aware of the choices we make, the tradeoffs we accept, and the biases we introduce when we proceed to measure and describe the physical, social, and economic phenomena of the world around us.

2. THE ASSIGNMENT
For this assignment you are being asked to address this problem head-on by turning a vaguely specified and potentially complex idea into a clearly specified definition that can be measured, presented, discussed, and analyzed from a quantitative perspective. In social science research, this process is known as “operationalization.”

Working first as a group, and then alone, you will need to think about the concept that is to be measured, and confront the tradeoffs between different quantifiable definitions and measurement techniques.

2.1. THE CONCEPT
Please choose one of the following to write on:

Density: Planners talk about density all the time: new urbanists promote it, zoning regulates it, developers crave it, community activists argue strongly for it or against it. Given all this activity- and despite the inherent quantitative nature of the idea- it remains a poorly operationalized concept. Imagine that you were hired by a nonprofit research and advocacy group interested in studying the relationship between density and health at a neighborhood scale. They have a pretty good team working on the problem of measuring health, but have asked you to help operationalize the concept of neighborhood density for them. What would you include, and how would you measure it?

Neighborhood health: Health is a good thing, we all agree, but do we always agree on what we mean when we talk about health? Is there such a thing as “neighborhood’ or “community” health, reflecting some amalgamation of the health of the individuals residing there? Imagine that you were hired by a nonprofit research and advocacy group interested in studying the relationship between density and health at a neighborhood scale. They have a pretty good team working on the problem of measuring density, but have asked you to help operationalize the concept of neighborhood health for them. What would you include, and how would you measure it?

Financial need: In order to fairly allocate society’s limited resources, many social programs- including everything from welfare payments to public housing subsidies- attempt to target needs based on the concept of financial need. As you might expect, different programs measure the concept of “need” differently, based on their internal goals, the populations they serve, their biases about who is truly “needy,” and the administrative protocols and limitations of the agencies involved. Imagine that you have been asked to assist a small non-profit preschool in developing a workable definition for “financial need” to be used in allocating their limited funds for family scholarships. What would you include, and how would you measure it?

Cost of Damage: Later in the course we will talk about the role of planners and quantitative data in regard to questions of risk. One component of risk is probability, which we will cover in the weeks to come; another is cost. For example, in making plans to avoid a natural disaster (or to avoid another natural disaster), we may need to talk about the potential costs of damage if we fail to act. Quantifying the cost of damage from a disaster may seem straightforward at first glance, but can very quickly become an intractable mess. For this assignment,
Imagine you have been asked to operationalize the concept of cost due to a natural disaster, to be used by researchers in a global study of the severity of different types of disasters over time.

**Waste:** These days, planners talk a lot about being smart, and a key part of being smart is not wasting stuff (money, land, energy, time, etc.). Everyone agrees that waste is a bad thing, but defining it can be quite tricky—is it wasteful to not take advantage of *every* possible efficiency, or is there some baseline that will keep you from being considered “wasteful”? For this assignment, imagine you have been hired by UWM to measure the Institute’s current level of “energy waste,” in an effort to ultimately measure progress towards eliminating it. How would you operationalize this concept for them?

2.2. THINGS TO THINK ABOUT
Once you have selected a concept from the list above, you can work with your classmates to “flush out” the issues; if done correctly, this collaborative process should actually make your job harder—not easier—as you will be forced to reconcile multiple perspectives and ideas about what is loaded into the particular concept in question.

We recommend you approach the assignment as you might approach any other typical planning problem: gather information and viewpoints, clarify goals, develop and evaluate alternatives, and then select a preferred option and explain why. You may work with others on all but the last of these steps (the final method for operationalizing the concept and the justification given should reflect your own thinking and work, not a consensus view).

In approaching this assignment, be sure to think about and address the following questions:

- Is it reliable? Will different observers all agree on how the concept is applied?
- Is it helpful? Does it distinguish between meaningful differences without exaggerating trivial ones?
- Is it fair? Does it introduce bias into the debate, rather than helping to clarify the situation?
- Is it scaleable? Can it help measure the concept for planners concerned with crafting comparisons or interventions at different levels (individual, household, neighborhood, city, state, region, international), or would that require a different approach? (You may want to think about the question of the “granularity” of your measurements—remember to ask me about this in class.)
- Does it strike the right balance between a holistic approach and a reductionist one? Is it “too fuzzy” at the expense of being useful? Is it “too mechanical” at the expense of failing to capture what we actually care about?
- Is it valid? Are you actually measuring what you are hoping to measure? (Remember: a measurement can be perfectly accurate and reliable, but fail in terms of “concept validity”…)
- Is it workable? Will researchers or planners be able to actually obtain the information that you recommend?
- Is it straightforward and clear? Many statistically relevant indicators are simply too complex to be of much use in a policy arena. Will people understand what is being measured and how? How will you explain it in “layman’s terms”?
- What problems have you knowingly accepted? This assignment forces you to consider tradeoffs in the choices you make. Which ones have you struggled with, and how have you justified the decisions you have made?

2.3. ASSIGNMENT DETAILS
The paper should be as long as you need it to be, but 3-5 pages is a good guide. The paper is due at the end of lecture on **Tuesday, 22 February 2011** (though it might be nice to pass it in directly to your TA (Michael Kavalar) prior to this date). Digital copies are accepted and encouraged, and should be submitted via “Drop Box” on D2L.
3. RESOURCES
In addition to the discussions we've had in class, you might want to pay special attention to the readings in chapter 2 of Meier et al. (2009).

No other outside reading is specifically required, but it would be wise to do some research on the quantitative aspects of the topic you have chosen.

ASSIGNMENT #2 (DUE 29 MARCH 2011)

1. THE ASSIGNMENT
For this assignment you are asked to read a journal article reporting the results of a quantitative study on a planning, architecture, design, or policy topic. In a short essay, you will be asked to summarize and critique the paper, and to pose questions, challenges, and recommendations for further inquiry.

1.1. THE ARTICLES
Please choose one of the following articles to read and critique. Note that you may want to look at them all before you pick- and don't feel you need to choose one that reflects your program group or area of expertise; there are important lessons you can learn from all of these. Articles that I've written are also free game to use for assignment number two; albeit, my published works can be found through my UWM website under portfolio.


1.2. THINGS TO THINK ABOUT
Although there is no set format required for this paper, you should try to address the following questions:

- What is the research hypothesis being explained?
- How does the author set their work in context of other studies?
- What concepts does the author want to explore/understand? How are they operationalized and measured?
- What data is the study based on? How was it collected and/or modified? What controls are in place to eliminate “noise” and “bias”? What limitations does the author admit?
- What is the argument being put forth? (Remember the idea of looking for a logical flowchart to an argument.)
- How was the regression model developed, what was included, and what was left out? What else might you want to include if you had the option of working with the author?
- How well are the results presented? How well are they interpreted? Do you agree with the author’s analysis of the all the relevant statistics?
- How well does the author make the case for a causal relationship, and not simply a statistical correlation? Can you draw a causal diagram of the sort you find in The Logic of Causal Order?
- What are the strongest statements the author can make about the results of his or her study? What are the weakest spots in his or her argument?
- How might you (or someone else) use, or be tempted to use, these results? What are the implications of this research? How generalizable are they for other settings or time periods?
1.3. A WARNING

**Warning:** In approaching this assignment, you should not assume that just because these papers are published that they are models of scientific and statistical excellence. At the same time, neither should you assume that the assignment is to find every minor or potential flaw. What we are looking for is an honest appraisal of the arguments and the evidence presented.

1.4. ASSIGNMENT DETAILS

The paper should be as long as you need it to be, but 5-6 pages is a good guide. The paper is due at the end of lecture on **Tuesday, 29 March 2011** (though it might be nice to pass it in directly to your TA (Michael Kavalar) prior to this date). Digital copies are accepted and encouraged, and should be submitted via “Drop Box” on D2L.

2. RESOURCES

In addition to the discussions we’ve had in class, you will obviously want to pay special attention to the readings on regression: notably chapters 16-21 in Meier et al. (2009). Beyond these, however, we expect you to think more broadly about the logic and scientific arguments presented: this is not merely an exercise in interpreting \( \beta \)-coefficients and levels of statistical significance.

No other outside reading is specifically required, but it would be great if you delved in deeply enough to see how this paper fits into a broader scientific debate. If there are particular data sources or indices that are used but not fully explained in the article, you may want to investigate them a bit as well.

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**FINAL PROJECT: DATA ANALYSIS EXERCISE (PROSAL DUE: 5 APRIL 2011; FINAL DUE: 10 MAY 2011)**

1. THE ASSIGNMENT

For this assignment, you are asked to use everything you have learned in class to gather and analyze your own quantitative information, and to present your findings in a clear, thoughtful, and honest report. The project must focus on planning issues and must use real data to demonstrate your understanding of the issues and your capability to use data analysis skills to support your arguments. A professional project that can enhance your employment opportunity should become the goal of this course project.

The actual choice of topic is entirely yours, although you must first describe it in a proposal meeting with your TA (Michael Kavalar).

2. PROPOSAL

Before you can begin work on your final project, you **must** submit a proposal on the idea to your TA. In your proposal please describe the following:

**Problem Statement:** What questions are you seeking to answer through your project, and why do they matter? How, specifically, will quantitative information be used to address these particular issues?

**Hypothesis/Argument:** What, if any, is the hypothesis you are hoping to test or argument you are expecting to assert? (Having a research hypothesis is highly recommended; strictly speaking, you could manage to write an interesting and insightful paper without one- and we are not looking for a full-blown scientific article or anything- but the language of hypotheses and scientific research can be helpful to structure your argument even along less rigorous lines.) Along with your research hypothesis, you might want to think about issues such as a “null hypothesis,” dependent and independent variables, confounding and lurking variables, internal and external validity, sources of bias and noise, and all the other aspects of measurement theory, scientific method, and research design we spoke of in the first half of the class.
Data Sources: What data sources have you identified, and what issues (if any) do you anticipate in terms of acquiring them, converting formats, cleaning, correcting, modifying, joining sets, and filling gaps. What concerns might you have regarding measurement instruments, bias in sampling, missing values, and the like, and how do you intend to deal with these problems? (You do not need to say everything that could be said in this section, but we want to use this as a placeholder to remind you of the significant amount of time you may need to spend gathering the data and “making it your own.”)

Your proposal does not need to be very long- 1 or 2 pages should be fine- but it should demonstrate that you have (a) identified an interesting topic that will allow you to demonstrate the full range of skills you have mastered in the class, (b) focused your thinking to a level that will be manageable given the scale of this assignment, and (c) begun to think about what information you will use and how you will use it.

Please note that timely submission of the proposal- and thoughtful consideration of the aspects of the project at this early stage- will count for up to 10% of the final grade for your final project (in addition to making your finished paper better). If your proposal is not received by 5 April 2011 your TA will not be allowed to give you a grade for this portion.

A project presentation is also required on the project proposal and will be held during lecture on 5 April 2011.

2.1. FINAL REPORT
Your final report should describe the work you did and the findings of your investigation. Although there is no set format for the final report, we recommend that you include some sort of Summary, a short Background section setting your project in context, a Description of Data used, a section on Methodology, and a section on Key Findings. Importantly, given the time and space constraints, you should not feel the need to be exhaustive or definitive- save that for a thesis, dissertation, or work project. The purpose of this project is simply to get you started working with quantitative data related to your work in planning, development, architecture, design, and/or policy, and to give you a chance to show off everything you've learned.

2.2. ASSIGNMENT DETAILS
The paper should be as long as you need it to be, but 6-8 pages is a good guide, plus graphics/tables, or other supplemental materials. The paper is due at the end of lecture on Tuesday, 10 May 2011 (though it might be nice to pass it in directly to your TA (Michael Kavalar) prior to this date). Digital copies are accepted and encouraged, and should be submitted via “Drop Box” on D2L.

3. RESOURCES
You are responsible for whatever other outside reading you feel is necessary to address your topic and put it into a planning, policy, development, architecture, design, or social science context. Keep in mind, however, that we are not all that interested in grading this aspect of what you do- that is for you, your advisor, and your other professors to worry about. To the extent possible, we will be limiting our review to the aspects of the topic that relate to the work we have done in the class: measurement and data assembly; hypothesis testing and data analysis; organization and presentation of complex quantitative information; dealing with estimates, forecasts, and uncertainty; writing clearly and honestly about your findings; and the like. Certainly draw on outside sources to frame your investigation, but remember that the goal here is really for you to demonstrate some technical mastery of statistical methods and quantitative reasoning, not to impress us with your outside research.
GRADE BREAKDOWN

A  90% and Above
B  75% and Above
C  60% and Above

Grades will be assessed using 90, 75, and 60 percent of total weighted scores representing A, B, and C, respectively. Plus and minus grades will be factored based on the percentage of total weighted scores between the aforementioned whole letter grades.