Learning Design, the Missing Piece of the MPP Curriculum

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Introduction

In the following pages, we describe a course in policy and program design. Why design, as distinct from analysis? The classic policy-analytic framework compares future worlds with different possible policies in place, and evaluates them according to relevant criteria. In Bardach's "Eightfold Path" [2005] a canonical step is to "Identify Alternatives"–but where do these alternatives come from? Frequently they are already in play, having been proposed by advocates and interest groups, but often a *Problem* (or *Opportunity*, as the motivating challenge is often better framed) is waiting for one or more good alternative responses, and inventing these is where the design arts overlap with policy analysis. Indeed, generation of a compelling policy sometimes manifests an opportunity not previously recognized.

Another reason to attend to policy generation as design is that public (and nonprofit) policies share a lot of properties with physical environments, so their creation might share some methodology. They constrain and regulate behavior (you can only leave a room where the architect placed a door, and you may only drive with a driver's license issued according to the DMV's rules), they manifest values and social order, they enable or obstruct social interaction, they conform individual behavior to common standards, and so on. It's not stretching the analogy to note that the figure-ground principle, "if you didn't have an environment, you couldn't have a self" applies. Just as physical environments demand explicit, practiced, design skills and are subject to a set of fairly common quality standards, we think non-physical environments, the alternatives to be compared in classic policy analysis, should be consciously designed and that policy analysts need design skills to do their best work.

The pedagogy of design is old, stable, tested, and well-known: classic Theory C learning [O'Hare]. Design (not design criticism or design appreciation) is learned in a *studio* by designing something and talking (i) about work in progress with the prof and informally with other students, and (ii) about "finished" work more formally in plenary session. Successive design tasks increase in difficulty and generate continuous learning. Occasional ancillary activities like very short lectures, background readings, and design criticism exercises punctuate and advance the main work.

The course, *Program and Policy Design Studio*, for undergraduates (Berkeley has a public policy minor) and MPP students, has been offered on and off for two decades at the Goldman School of Public Policy, and before that at the Kennedy School of Government. This year's syllabus is attached as Appendix A. In the pages that follow, we describe the course, its intentions, and some of its distinctive challenges.

Assignments

What makes a good design exercise

Assignments in a design class state a need, problem, or opportunity, and a client of some sort, indicating where the student should go but not a well worn path to it. Assignments for which the instructor knows a "right answer"–a really good solution, perhaps from previous years–become rhetorical and actually dishonest: the task presented as "invent something new and wonderful" is actually "guess what I already know and won't tell you" and students pick up on this non-adult footing quickly. A good assignment is specific enough to prevent flailing about but open-ended enough to allow several interesting and reasonable approaches. The latter is especially relevant to the group goals of a project, which is to generate a set of designs that are illuminating to compare with each other on several dimensions.

The assignments need some background describing the context and occasionally the problem history, but this can be sketchy, as part of the work is doing relevant research as the task unfolds. As Rosemary Joyce points out[1], active learning tasks must be feasible in the time available, for students who have other courses to pass and lives to get on with. One way to contain the assignment is to limit the scope of the problem: instead of, "design a tax code for Peru", "design an excise tax on automobiles for California."

Another, inevitable in this kind of education, is to have the assignment cover only the earliest stages of a real-world project. Students in architecture school

[1] The authors had the good fortune to attend a program on *How Students Learn* http://gsi.berkeley.edu/howstudentslearn/index.html in the spring of 2011 that provided several useful insights we have drawn upon in the 2011 edition of this course; Joyce was one of the speakers.

never build the buildings they design and don't even prepare what are called "working drawings" that could be given to a contractor. Joyce recounts that in early instances of her museum curator course she asked students to create an exhibit for a museum as a final project. After she realized that that takes up to three years in the context of a museum curator's career, and students had less than three months, she now asks students to *design* a display for *one* piece of art within an exhibit in which she give a significant amount of background information.

It does not seem important that these exercises match any particular students' professional or substantive focus; as far as we can tell they readily engage with tasks far from their known interests and sometimes learn more from this stretch than from staying in their context comfort zones.

Deliverables (in addition to the conventional stack of PowerPoint slides) vary with each assignment, to force students to generate some important elements of policy discourse, like flow charts, press releases, speeches, and the like.

Example assignments (see Appendix II)

Child Care

As part of a consulting project several years ago, O'Hare collaborated on a teaching case for a mid-career program for Italian provincial and local managers, *Nidi d'Infanzia*, which described the funding and administrative arrangements, and some of the internal political debate over management, for municipal child care in Bologna (one of the best-run cities in Italy). He translated the case and used it as background for the following:

> **The child care centers in Bologna are losing money and oversubscribed. Design a pricing and marketing scheme for them. Deliverables:**
>
> **--a presentation**
> **--the brochure describing your scheme**
> **--a 60-second radio public service announcement**

We use it this year as an optional individual project. It has been a reliably successful assignment, for which students regularly surprised us and themselves (though it is typical of this course that, in the words of one former student, "we all reached higher than we thought we could on these projects"). Bologna has a wonderful website, almost all in Italian, but the students manage to cope with it with the help of an occasional Italian-speaker and several others whose Spanish gives them just enough access.

This project is especially useful in motivating focus on goals and users, because to make a coherent design, it is first necessary to decide whether child care is a service to mothers so they can work, to employers so they can employ mothers,

to children so they will do better in school, or (as the Italians actually see it) as a service to society as a whole, particularly in making better citizens down the line. The foreign context allows them some distance from the problem and the culture, and a look at an especially competent government-citizen interface.

Citizen Engagement

The first major assignment in 2011 (see examples in files attached) was

Design a system to engage Berkeley citizens in policy decisionmaking for land use. Deliverables:
–The press release announcing the new program
–A ten minute speech for Gordon Wozniak (City Council member) to deliver in the council
–A presentation describing the system

Councilman Wozniak had previously approached O'Hare to discuss his interest in improving citizen feedback, especially from students (who vote in Berkeley). Wozniak visited the course to give background and answer questions from our students on the topic of city planning and land use, was available for consulting on the project development, and joined us for presentations and asked questions.

Startup activities

Prior to these two assignments the students had background reading on design principles in the policy context and in engineering, the latter taken from four wonderful short books by Gordon Glegg [2009].

To signal the hands-on flavor of the course and hit the ground running (and to make it easy for students to figure out that they're in the wrong course and drop quickly), the first day offered what is called a "sketch problem":

The first words to learn in a foreign language are "thank you" and "sorry". Design a means to communicate these between drivers in automobiles.

Everyone gets a large sheet of easel paper and a bunch of magic markers are put out, with advice to "draw a picture with minimal text". (Examples in Appendix III). These are taped up on the wall, and everyone is given six colored stick-on dots to distribute. The designs with the most dots get discussed in plenary session, comparing what each did well, what aspects of the challenge were missed, etc. Without much instructor discussion leadership, students ask essential questions which built their metacognition around designing. Students inevitably asked, "Why did you do that?" "Did you consider?" "How would certain groups react?" "How

feasible is this?" "What if you did something else?" Each question prompts the designer to articulate why and how, or realize that he didn't consider that question. Some essential concepts like policy scope, model of the user, and unintended consequences, present themselves in this first day and can be named for later reference.

After the first three weeks students created a vision for the course. The How Students Learn program had emphasized that learning increases when students have ownership and control over their learning, and asking students what they wanted from the course, and what they hoped to be true by the end, enabled them to become active in their own engagement with the various opportunities it offered.

The visions covered different aspects of the course (examples in Appendix IV). A subset of students wanted to understand how the different elements of a design interact with each other, and how to make decisions among different elements. Another subset wanted to know how to create a design that addressed multiple issues, while another group wanted to understand current policy designs through the process of creating, the metacognition of designers, through designing their own projects.

The process of vision setting is iterative. Students will come back to their visions and revise them with what they have learned and designed. At the end of the semester we will ask students to evaluate how they performed in relation to the vision they set.

Design Process

One of the most important design skills is the ability to know where, in a process with stages and intermediate results, one is. An important part of the pedagogy in this area is to constantly draw attention to these stages as the students move, not always neatly, through them. The stages, in architecture slang, are commonly called

- Problem definition (and limitation)
- Blob diagramming
- Parti identification
- Sketching
- Design development
- Design revision
- Working drawings

The second of these is difficult to adapt to the policy design concept: for a building, it generates a picture with shapes of non-building plan form, often circles, whose area roughly corresponds to the square footage of the building program

requirements, arranged to illustrate what should be near what, what needs to be separated from what (*ie*, acoustically), and often what should be where with respect to the sun's path across the sky or to a view.

The third, whose name comes from the French past participle of *partir* = "depart", is the underlying core idea informing the design; the idea is that when you have chosen a parti, you have started on a particular path and not on a bunch of others you could have chosen. An example in dormitory architecture is "a block of double loaded corridors", which will not evolve into "a courtyard surrounded with stairway entries" though corridor buildings can differ from each other in many important ways. An example in policy design might be selection of one of the eight mechanisms (subsidize, tax, inform, implore, etc.) discussed in [O'Hare 1989].

A sketch is a picture (possibly a sentence outline), almost always freehand, that represents the actual policy (blob diagram elements taking on real shapes and starting to fit together, for example) that captures the parti and some key decisions about making it work, but with minimal explanatory detail. An architectural plan sketch might have rooms and corridors, walls indicated with single lines, and windows where important, but not door swings, precise dimensions, or finishes. A good form for a policy sketch is a flow chart, showing who does what when, and some indications of why.

Design development is iterative; the design accumulates commitment and detail, but frequently loops back to accommodate issues not visible in earlier stages, or late-blooming ideas. Revision almost always follows presentation of design concepts to the client, and engagement with zoning, building code, and financial realities. Working drawings correspond to the executive order, regulations, or legislation implementing a program. Of course a final stage, in which people are occupying a building or engaging with a policy, is where the pudding is proved.

Activities

The typical assignment is done by a group of four or five students, (some assignments are individual) and proceeds through the initial assignment (on paper, with ten to fifteen minutes of lecture introducing it), group assignments (always random), group meetings in class working on their projects (Fig. 1), consultation ("desk crits") with faculty about sketches and work in progress, meetings and working sessions outside class as the project goes through the stages listed above, presentation to the class as a whole, and faculty critique/grading.

The technology is for the most part familiar, but we urge them to try the low-tech use of soft pencil and tracing paper. Layers of tracing paper as sketches allow revision to proceed without having to draw everything again and again, but early ideas are allowed to fade out compared to new ones as the stack builds up. We also emphasize pushing the graphic language of diagrams and charts beyond identical boxes connected with identical arrows to use line weight, color, and size to show important differences (for example between a flow of money and a flow of information).

The in-class working sessions have two purposes. Instructors can ask questions to ensure students are holding on to the metacognition about design that they gained from previous assignments and presentations, and to draw their attention to decisions they have made intuitively. More important, they facilitate adapting, borrowing and inventing among students. Often we see initial working drawings change because one group of students talked to another group about how they were designing, which sparked a different approach to their design. During in class working sessions students often ask, "What if we…" "How did you come up with…?" "How do we….?" These open ended questions generate more information that provide more alternatives for their design, and enable them to make more decisions about their process. For an extensive discussion of the coaching process in design, see [Schön, 1984]

Grading and evaluation

Grading student work in this kind of a course is frustrating and unsettling. Projects can excel on many dimensions; including dimensions not anticipated when the assignments are prepared. Fortunately the freedom granted by the format seems to motivate students to very high performance and admirable risk-taking, so it's rarely necessary to give low or even mediocre grades. Still, grades are noisy and highly judgmental, and awarded without the comfort of official right answers to exam questions.

We have been using classroom response systems ("clickers", e.g. www.iclicker.com) in other courses and use them here occasionally in project introduction discussions, and for all students to "vote" on three key evaluative questions about each presentation, for example rating the design on "Implementation potential: A. Very easy B. Moderate C. Very challenging". We report these results to the groups, but don't count them strongly in grading.

As the prior discussion indicates, the studio environment and group projects make students responsible for a lot of each others' learning. Class participation is 40% of the course grade, and is assessed through a confidential survey by the students, who grade each other on the criterion, "X's contribution to my learning in this course". The form reports attendance data, which the students are invited to use as they wish, and includes two lists of names, with grades given to students the grader was in a group with weighted more heavily. We do this three times, the first two don't "count" but the results are published alphabetically within terciles so no-one is at the top or bottom. After the last round, the faculty grades the person at the bottom of the list and all other grades go up from there to A+, so it's in everyone's interest to raise the performance of people at the bottom.

This scheme risks personal score-settling and even collaboration, but O'Hare has been doing it for many years and the central limit theorem, along with students' basic decency, seems to take care of those problems. No single student can trash another's grade, and as far as we can tell, the data (which we have no other way of collecting) seem reliable. Additional advantages of this grading scheme are that it devalues students' highly practiced skills at massaging the ego of the prof, and greatly suppresses air-hogging and web-surfing or playing games on laptops during class. To help this process, we post without particular endorsement a memo developed by students over the years describing qualities that seem important to being a good citizen in a course like this, or a discussion course (Appendix D), nag them to bring and display double-sided name cards, and put thumbnail photos on the grading spreadsheet they use.

Core design concepts

Good designs have some enduring common qualities. Telling the students about them seems to have little value, except perhaps for establishing a vocabulary, but catching them when their work has these different kinds of merit, and making a fuss about it, has real payoff. Here are some of the things we lie in wait for.

Adapting, borrowing, inventing

The last real innovation in architecture (as distinct from engineering), a field so reliant on innovation that it doesn't have or need copyright protection, was the dome, invented about sixteen centuries ago. Since then, new and different buildings have been made by reassembling the same elements (door, wall, floor, column, window, etc.). We encourage students to look for something that worked in a different context, and in each others' designs, that they can adapt for their own projects. This practice, essential to art and design, is a little crosswise to university plagiarism conventions, though entirely consistent (for example) with the mashup music that students love and admire.

Model of the user

It is essential to good design that the designer have what we call a "model of the user", a conception of how people will act in the proposed environment and, especially in the policy context, how others will cause the policy to take effect. Obviously a good or accurate model is better than an erroneous or romantic one, but the most important thing is to articulate, and be conscious of, what that model is. What incentives are we depending on? What do users know when they meet the policy?

Students often begin to understand the model of the user on the first day after designing for car courtesy. However, it doesn't come naturally. All posters are designed from the view of the receiver of the message. We see the outside of the car, or we see the hand signal they created. However, we rarely see students consider or indicate why drivers will use their design. Nor do we see much about implementation by the Department of Motor Vehicles. Students tend to begin the design process focused on a result that an unspecified, assumed, process will generate, and see the result much like an object rather than someone using something: one of the principal pedagogical aims of a studio course is to put use in place of object, and process in place of outcome.

Use of failure

Design, like baseball, is in large part a series of failures. This is hard to reconcile with students' implicit idea that each assignment has a right answer, like an exam question, and they just have to find it: a program that satisfies all the explicit and implicit requirements of the assignment. In fact, all designs fail in one way or another, and most design process steps fail to advance the project in the obvious way. The only solution to the automobile courtesy project known to us that completely "solves the problem" is a box on top of the car like the news crawler on the New York Times building, that can scroll the words "thanks" or "sorry" for all to see, but it obviously fails a fitness and appropriateness test; no-one would have such a thing on his car.

We push students hard to see failures as successes in illuminating the problem and in building their repertoire of design elements. Our second large project (design a scheme to limit the carbon intensity of California vehicle fuel that appropriately accounts for enduring uncertainty about what a given fuel component's (especially biofuels') real carbon intensity is) was so difficult that no group really put the animal on the ground (we repeatedly warned them that they might find it impossible, and not to be discouraged). But it generated a group of designs whose partial successes and intrinsic failures supported a really good comparison of approaches and Gordian knot attacks.

For the citizen engagement project, some students built an initial scheme around regular email to all students at Berkeley with land use updates. However, they realized that multiple privacy policies make it effectively impossible to do this, and that if all students at Berkeley should get regular emails, land use debates in Berkeley are not the reason such spam should be privileged. Granted, the group of students could have designed a campaign to change the privacy policy, but decided that abandoning the email design would be a better process because they valued implementation and feasibility, and went back to the drawing board.

What makes a good design

In addition to the metacognition of design, which students develop through questioning others and designing themselves, we find that students also develop an understanding of more abstract elements of good design through the process of designing and discussion. After students discover these elements they seem to implement that knowledge to improve their next exercise.

Intrinsic user manual

Good designs incorporate their own instruction manual. We expect to see how to enter a building quickly when we look at it from the street, and without

reading a sign or map, and how to pay sales tax right at a cash register. The iPhone is famous for this quality: people can pick up this very complex piece of equipment and be guided through swipes, taps and the like by actually executing the next obvious action.

Much public policy is damaged by being opaque to the user: British roads occasionally display the warning sign "Offside ramps": visitors to the sceptered isle have no idea what to expect,, or where, though a graphic would probably work perfectly. We push students to think about what background and experience the user needs to engage with their designs.

When asked, a question like, "how does [the applicant] know what to do, or why?" a design group becomes conscious that the design itself may not illuminate that information. As students begin to explain how their design works, they realize, importantly, that the more effort it takes from the designer to describe the function of their design, the less intrinsic a user will find the design's purpose or practice, and they realize they will not accompany their design into the hands of their user. In fact, they might not accompany their design into the hands of the producer, or process enforcer.

Policy Scope

Good designs embrace the right amount of their potential substrate, which is rarely all of it but always more than a tiny bit. The automobile courtesy example nicely puts this criterion on the table, as different schemes can operate on all cars immediately, or new cars as the fleet turns over; they can operate in daylight only or also at night; and the signal can reach to the front, sides, and/or behind the car. Every extension of the desired policy scope entails a compromise or increasing marginal costs of the program.

Bird-stone ratio

Many elegant designs accomplish several different things by the same means, or a single action: obligatory consumer separation of solid waste into recycling streams not only economizes on municipal disposal costs but also helps the planet and teaches citizens an important way of thinking about resources. However, trying to do too many things can also lead to a confusing explosion of frightened birds going off in all directions and wasted stones, or a Swiss Army knife assemblage of unrelated elements, none really very good at its job. In an attempt to make their designs bulletproof against criticism, students often slap on features to accomplish unrelated objectives or to make them look like a bigger "bargain."

Like policy scope, the proper bird-stone ratio is different for different partis and different problems. The teaching objective is not to tell the students the

optimum, or a rule, but to make them more likely to get it right by being more skilled in considering the criterion explicitly.

Manifest merit

The great designs (graduated income tax, differential calculus, the common law, *La Traviata,* Notre Dame de Paris, etc.) are obviously wonderful in an integrated, holistic way. We look at them and say, "wow!" even though they have defects, mistakes, and incomplete features, and even when we are not expert in their respective fields. Students understand this, but as their designs develop they tend to fall into a defect-patching mode that doesn't always help them proceed. Perhaps because so much of their education has been in defect-finding, take-off-points-for mistakes, excellence-beyond-A+-is-invisible mode, they often seek refuge in more precise problem definition, an expectation the faculty has to continually frustrate. They also tend to offer the history of their design process to justify their result: "First we tried A, but that didn't work, and then we tried B, so now you have to agree that C is the best possible design."

In the Citizen Engagement exercise, students were torn about how much information to include for users, and what the policy scope should be, and asked faculty to tell them, for example, whether they should show the history of land use at a project site. They wanted to know if the problem was that citizens were not informed, or if information was not available, or if the problem was citizen apathy. This dialogue of course leads to infinite regress, so it has to be turned back with "well, what do *you* think?" non-answers. We want them to research those elements and make a decision about who the user is, and choices about the functionality of different elements themselves, without a stricter problem definition to guide their decision making. As the course proceeds, students develop more confidence that they can generate designs that explain themselves and show their own merits, and why trying to show that the B minor mass is a masterpiece because of all the mistakes Bach didn't make is wrongheaded (and not because mistakes are unimportant).

Process, honesty, complexity/coherence), meaning

In an earlier work, [O'Hare 1996], O'Hare described four abstract qualities that good environments have–qualities that increase the value created when people interact with them. These are

- Complexity/coherence
- Evidence of process
- Meaning
- Honesty

Briefly, complexity/coherence is a pair of complements (on the figure/ground complementarity principle): rewarding environments are complex (not the same as "complicated") and worth attention, but have an underlying coherence or organizing principle, and each quality makes the other possible. Good environments usually show a process or change in progress, whereby the future will be different from the present and better for it. They are about something bigger than themselves, like a graduated tax being about justice and not just revenue collection. And they correctly represent what's going on: a gasoline tax that charges for the externalities of driving is honest; subsidized gasoline misrepresents the real costs of consumer behavior and is not.

We share the 1996 paper with the students, but with modest effect as there is no final exam on which they can repeat back its insights. However, when we can point out that a design approach students have undertaken has one or another of these qualities, it seems to create learning they can use in the future.

Challenges

The design studio does not translate effortlessly from its origins to the policy school context. One challenge is finding an appropriate workspace: architecture and art students have permanent workspaces like drawing boards in a room together, where they spend most of their time. Few college classrooms are suitable for a course like this, or actually for any learning in which group work is important. Because colleges are inexcusably undercapitalized, even these are not usually available for students to use for the time the course demands (we assume about 12 hrs a week). We hope to schedule this course in the future for the same four units, but with four hours a week in class for discussion, desk crits, and presentations, four more hours work time together in the tables-and-chairs classroom, and four hours independent preparation/reading out of class.

In an architecture studio, everyone's work is out on a drawing board to look at and schmoose about, and students are constantly wandering around doing that. Policy design is usually embodied in text, and a page of text on a computer screen does not invite the same interaction as a picture on a large sheet of paper, or a model.

The basic pedagogy, as we said earlier, is uncontroversial and long-tested in the environments from which we have adapted it. It is fun for faculty and students, which is not unimportant. We are quite sure that lecturing, or talking about good policy designs by others, are no more likely to build design skills than lectures or listening to great performances will enable, much less cause, students to play the piano. However, we have very little real evidence about how much learning, of what kind, alumni of this course actually use. That this is true of a large part of the policy curriculum is fairly cold comfort and indicates real value potential in developing research-based evaluation mechanisms for teaching elements of the whole enterprise.

References

Bardach, Gene. *A Practical Guide For Policy Analysis: The Eightfold Path To More Effective Problem Solving*. Washington, D.C: CQ Press, 2005.

Glegg, Gordon. *The Science of Design, The Selection of Design, The Development of Design, The Design of Design*. All Cambridge: Cambridge U. Press, 2009.,

Joyce, Rosemary. "How Students Learn." 2011 UC Berkeley, GSI Teaching and Resource Center. http://gsi.berkeley.edu/howstudentslearn/index.html

O'Hare, Michael. "Pedagogy for Policy Analysis and Management." *J. Policy. Analysis & Mgt.*, 27/4 2008.

____, "A typology of governmental action." *J. Policy. Analysis & Mgt.*, 8/4 1989. .

____. "Attention, Value and Exchange." *Center* 10 (Center for American Architecture & Design, Austin), 1996.

Schön, Donald. *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books, 1984.

Appendices

I: Syllabus (2011)

GOLDMAN SCHOOL OF PUBLIC POLICY
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PP156/256, PROGRAM AND POLICY DESIGN
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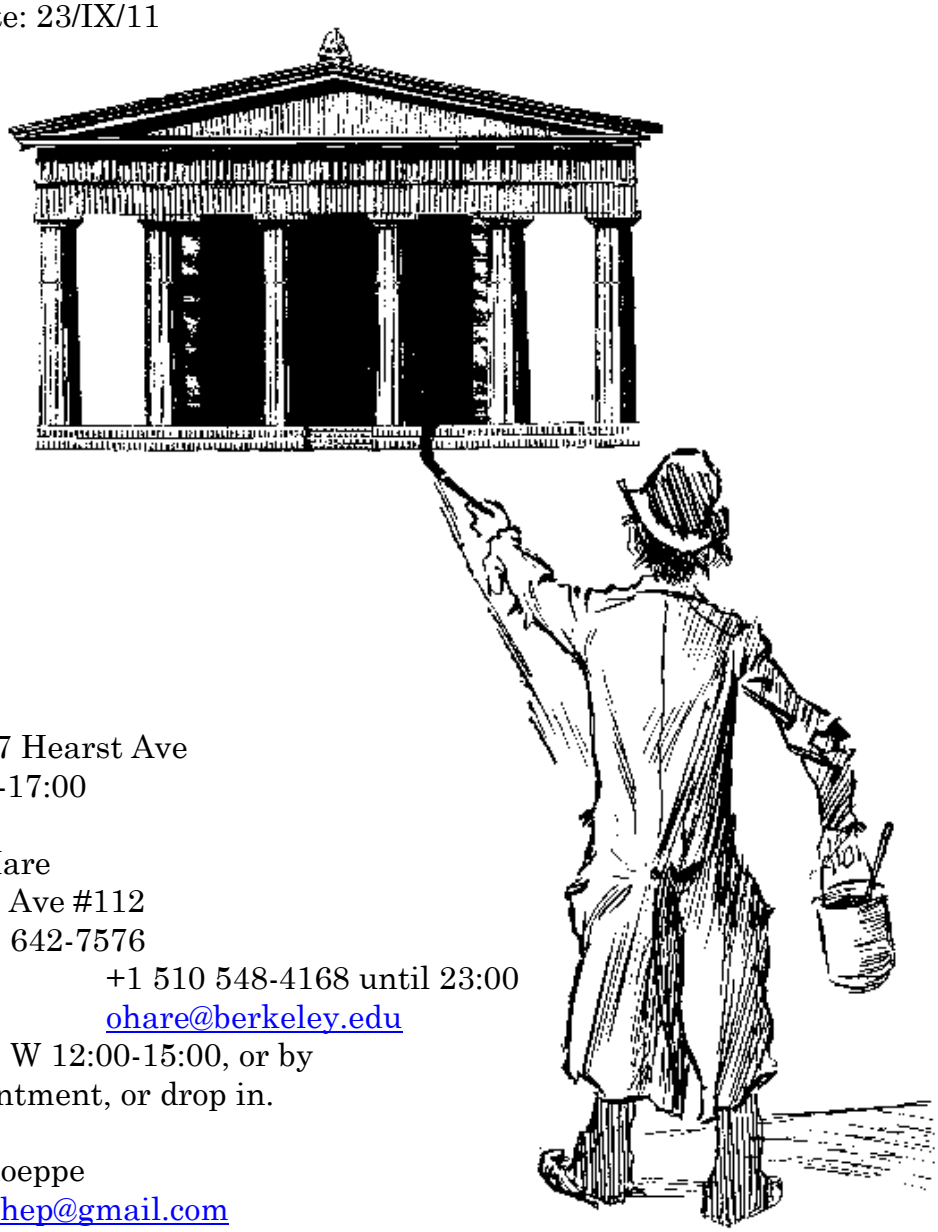

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General

With experience, training, instinct, and skills a government or non-profit executive can produce public value in a world of mediocre, and even downright ill-conceived, programs and policies. However, a good set of regulations, statute, or agency program is as almost easy to create as a bad one and much nicer to live with. Like buildings or furniture, public programs and policies are designed somehow. This course is an environment in which to become a better designer.

Design is a uniquely human competence and unusual among professional skills in several ways. First, we know rather little about it. We can be analytical and descriptive at the edges of the design process -- evaluating designs and identifying their merits and faults, describing the external behavior of successful designers, setting criteria for design problems -- but the actual creation of something new remains fairly mysterious despite the fact that it happens all around us all the time.

Second, it is fundamentally and inescapably integrative and holistic. Design requires attention to many dimensions of a problem at the same time, and a good design is never good because of one narrow quality.

Third, despite the romantic convention of the artist pursuing his unique vision in lonely splendor, design is collaborative and social both across and along time.

Fourth, the design process invokes -- though not as completely as most people believe -- personal qualities that we tend to think of as intrinsic or unchangeable: creativity, imagination, originality, and so on.

Fifth, design is more fun than analysis and administration.

The Design Studio

Fortunately, we know more about *how to learn to design* than we know about *how to design*. What we know is that design, like welding or swimming or winning elections or neurosurgery, is learned by a repeated cycle of *doing* it and thinking carefully about what just happened and why. We also know that in the broad range between hopelessly inept and genius, design skills can be developed and learned by almost everyone. The abilities to find ideas, organize and assemble them, and sort them out into a coherent pattern are widespread, not rare. The formalization of this learning is, in the physical design fields of architecture, planning, and the plastic arts, called a *studio*; in engineering it is called a *laboratory*.

PP156/256 is a studio/laboratory course. Over the course of the term, we will solve a series of design problems, sometimes in groups and sometimes individually. The problems have no right answers yet. We can't solve them by looking up something, or guessing what the instructor or anyone else has in mind (though good designs almost always assemble pre-existing elements from here and there rather than creating something completely new). They probably have no single right answer at all. Indeed, they are so complicated and open-ended that it

will be difficult to decide that one solution is overall better than another. The solutions will be captured in various forms; sometimes pictures, sometimes text, sometimes other standard media of government discourse like speeches and press releases. Periodically we will have what architecture schools call *juries* or *reviews*; all or a selected few of the designs will be presented and compared in a group discussion, sometimes with invited guests.

This format will assure attention to three distinct but inseparable elements of design, elements that constitute the substantive material of the course:

(1) What is a good design?
(2) How do you do it?
(3) How do decision makers recognize a good design?

Requirements and Grading

The main requirements of the course are of course the designs themselves. These will be graded with weights proportional to the time allotted and increasing as the term progresses: early projects will count less than later ones. The criteria for grading are fairly complicated and will be discussed in class. Projects count 60% of the final grade.

Each student will keep a journal, counting 10% of the grade on an all-or-nothing basis, recording insights and comments as they occur, reflections on the course and on the activity of design itself, and at least four annotated bibliographic references to articles or books that were (or looked as though they might have been but weren't!) useful. The journal should also contain a detailed record of the development of at least one project during the term, with sketches, outlines, notes etc. incorporated and annotated.

Because design is a collaborative process, the remaining 30% will be based on each student's contribution to the learning of others in the course, as judged by the other students. This standard is also complicated, involving not only the obvious element of "saying true things that I didn't know" but also contributions like "making instructive mistakes" and even "helping the class keep a sense of proportion at awkward moments." Different people will presumably contribute to the learning of others in different ways, so the standard is not only complicated but also contingent. We will spend some class time discussing criteria for this judgment.

Graduate credit (PP256) requires one additional individual project or paper by arrangement with the faculty.

Space and Time

Rm 105, 2607 Hearst Ave.. The room allows projection of anything on your laptop computer or a Windows-readable file on a thumb drive, opaque media

(document camera) and VHS or DVD video. The course's virtual presence is on bSpace.

Other resources

Four short books by Gordon Glegg, *The Science of/The Selection of/The Development of/The Design of Design,* are on reserve at Moffett Library. Other readings will be online (b reserve in Moffett library or in a required reader available from Copy Central on Hearst, or will be distributed in class. The assigned readings are almost certainly not sufficient to do a good job on these exercises: students will want to spend some quality time on Googlescholar and, yes, Wikipedia once they have a handle on the core challenges of each problem as they have chosen to approach it. However, it is imperative that you do the assigned readings by the day they are listed.

You need an iClicker, available at the ASUC store, registered at www.iclicker.com.

Schedule

Aug. 25 **Exercise I: Courtesy on the road**
In class activity, no preparation required.

Aug. 30 **Exercise II: Citizen Engagement (startup) Groups**
Guest: Gordon Wozniak, City Councillor, Berkeley

Sept. 1 **Design Process: parti, sketch, embodiment. The model of the user.**

Readings:

West Dakota Cafeteria (prepare a design for *implementation of the two-price system* for class discussion) B

Weimer, David, "The Current State of Design Craft..." *Public Administration Review* 1994 http://www.jstor.org/stable/976703

__, "Claiming Races, Broiler Contracts..." *Policy Sciences* 1994 http://www.jstor.org/stable/4532251

O'Hare, M., "No-ceiling Government" B

Glegg, G., *The Selection of Design,* Cambridge U. Press, 1972, pp. 1-32

Norman, Donald, *The Design of Everyday Things,* pp. 1-33, 187-217

Sept. 6 **Exercise II: Working session**
Group meetings and desk crits
Each group should have a sketch of its approach for discussion with faculty.

Sept. 8 **Short exercise: Vision and goals**
TBA

Sept. 13
Short exercise: Show and Tell

Bring to class one object that you consider especially well-designed (last initial A-M) or especially poorly-designed (last initial N-Z), and be prepared to explain why it's interesting and why you chose it. No VCR's, iPods, or remote controls. You can bring a picture if your object is too big, but physical examples are preferred.
Exercise III: Energy and Environment startup

Sept. 15 **Exercise II Presentations**

Sept. 20 **Exercise III: Working session**

Sept. 22 **Exercise IV startup: Nonprofit management**
Design a quality assurance program for teaching at UC Berkeley

Read:
Harvard Business School, A Note on Quality
UC Academic Procedures Manual, §210
O'Hare, Quality Assurance for Teaching at APPAM Schools B

Sept. 27 **Exercise III: Presentations**

Sept. 29 **Exercise IV: Working session**

Oct. 4 **Exercise IV: Working session**

Oct. 6 **Exercise V startup: Built environment (teams of 2)**

Visit a residential neighborhood built on steep hills, in San Francisco (sum of last digits of team social security numbers is even) or in Berkeley/Oakland (sum of last digits is odd). Present up to six photographs and tell us why the streets and houses are they way they are.

Oct. 11 **Exercise V presentations,**

Oct. 13 **Exercise VI startup, cont.**
Transportation, Daycare, or Streaming radio (choice)

Oct. 18 **Exercise IV, presentations**

Oct. 20	**Exercise IV: presentations (cont.)**
Oct. 25	**Exercise VI: Working session**
Oct. 27	**Individual Project proposals due, 5 PM "**
Nov. 1	**No class (APPAM conference)**
Nov. 3	**No class (APPAM conference)**
Nov 4	**Individual Project comments returned**
Nov. 8	**Exercise VI working session**
Nov. 10	"
Nov. 15	**Exercise VI presentations**
Nov. 17	**Exercise VI presentations (cont.)**
Nov. 22	**Individual projects**
Nov. 29	**Individual projects**
Dec. 1,6,8	**Individual projects presentations**

II. Assignments

Exercise II
Citizen Engagement

Design a system to engage Berkeley citizens in policy decisionmaking for land use.

Deliverables:

The press release announcing the new program

A ten minute speech for Gordon Wozniak (City Council member) to deliver in the council

A presentation describing the system

Read:

Klitgaard, R., Policy Analysis and Evaluation 2.0

de Tocqueville, A., *Democracy in America TBA*

Heifetz, R. , *Leadership Without Easy Answers* 1,2,4,7

Watch the City Council meeting http://berkeley.granicus.com/MediaPlayer.php?publish_id=796 especially from about 0:20 to 0:40, and 3:21 to 3:45, not so much for content as for style and procedure.

Explore www.opentownhall.com

Exercise III
Environment and Energy

Background A widely cited article in *Science* http://www.sciencemag.org/content/305/5686/968.full characterized the challenge of stabilizing the earth's climate as choosing the equivalent of seven "wedges" from fifteen types of greenhouse gas reduction. One of these wedges is to reduce emissions from cars by half. All are challenging; no single "silver bullet" will suffice to deal with global warming.

California has enacted a law, AB32, which provides for a variety of carbon reduction policies, and among these is the Low Carbon Fuel Standard, which requires the reduction of the carbon intensity of vehicle fuel used in the state by 10% over the ten years from 2010 to 2020 http://www.arb.ca.gov/fuels/lcfs/lcfs.htm . So the LCFS seeks to achieve, for California, one fifth of one wedge.

This is a "cap and trade" program: each fuel blender/wholesaler calculates his "average fuel carbon intensity" each year; if it falls short of the standard, he has to pay a fine or buy credits from another blender. If his score is below the standard, he has credits to sell to others.

For producer j in year t who blends Q_i units of fuel with GWI (global warming index) G_i, the fine (or sale of credits) C_{jt} when the standard is S_t will be:

$$AFCI_{jt} = G_p Q_p + G_b Q_b$$
$$C_{jt} = \left(S_t - AFCI_{jt}\right) P Q_t$$

P = price of credits (+/- sold or bought) (or fine); *p indicates petroleum fuel, b a biofuel.*,

Notice that this program does not dictate any technology; if lots of electric cars come on the road (electricity in California is much less carbon intensive than gasoline per unit of energy), the utility companies will have credits to sell to liquid fuel distributors, and this is a satisfactory outcome. A federal program, the Renewable Fuel Standard http://www.epa.gov/oms/fuels/renewablefuels/420f11018.htm , takes a different approach, and requires the use of certain amounts of fuels judged by be "renewable" by a similar life cycle type of analysis.

When the LCFS was designed, it was believed that compliance would generally be achieved by blending a biofuel, especially ethanol made from corn, with gasoline (or diesel from soybeans with petroleum diesel), and, importantly, that the GWI of any fuel was relatively easy to determine accurately by so-called "life cycle analysis". http://www.sciencemag.org/content/311/5760/506.abstract The LCFS strategy is itself controversial; for example, see http://www.aeaweb.org/articles.php?doi=10.1257/pol.1.1.106 , but for this assignment, the problems Holland et al discuss are probably not central.

However, in 2008, Searchinger et al published an article showing that when biofuel feedstock cultivation (especially corn in the US) displaced food crops, the world food markets transmitted price signals that ended with clearing of forests with a large carbon discharge, large enough to wipe out the carbon intensity advantage of some biofuels. http://www.sciencemag.org/content/319/5867/1238.abstract This carbon discharge is now called ILUC for *indirect land use change*.

The carbon intensity of fuels is conventionally measured in "grams", more precisely gCO_2e/MJ: grams of carbon dioxide equivalent (that is, CO_2 that would have the same warming effect as the gases actually emitted–for example, growing corn with nitrogen fertilizer emits N_2O, a powerful greenhouse gas) per megajoule of energy provided when the fuel is burned. Gasoline's GWI is about 95 g, corn ethanol ignoring ILUC varies from 50 to about 90 g; Searchinger's ILUC estimate is about 100. Since that paper, many estimates of different biofuels' ILUC values have been published, using different analysis methods, and vary from as low as 10g to 50. http://pubs.acs.org/doi/abs/10.1021/es101946t

The problem this poses for the Air Resources Board (and for other governments trying to reduce the carbon intensity of fuels, including the European Community and the US government in other ways) is that to implement the LCFS, it must assign a GWI value to every fuel that enters the CA vehicle fuel market, and with complete precision. It doesn't work to tell a blender that the ethanol he is using has a GWI "between 10 and 50, we're not sure" because he can't figure out what fine to pay or what certificates he can sell. Other policies are less stringent, but still require deciding whether various biofuels are "greener" than gasoline or not.

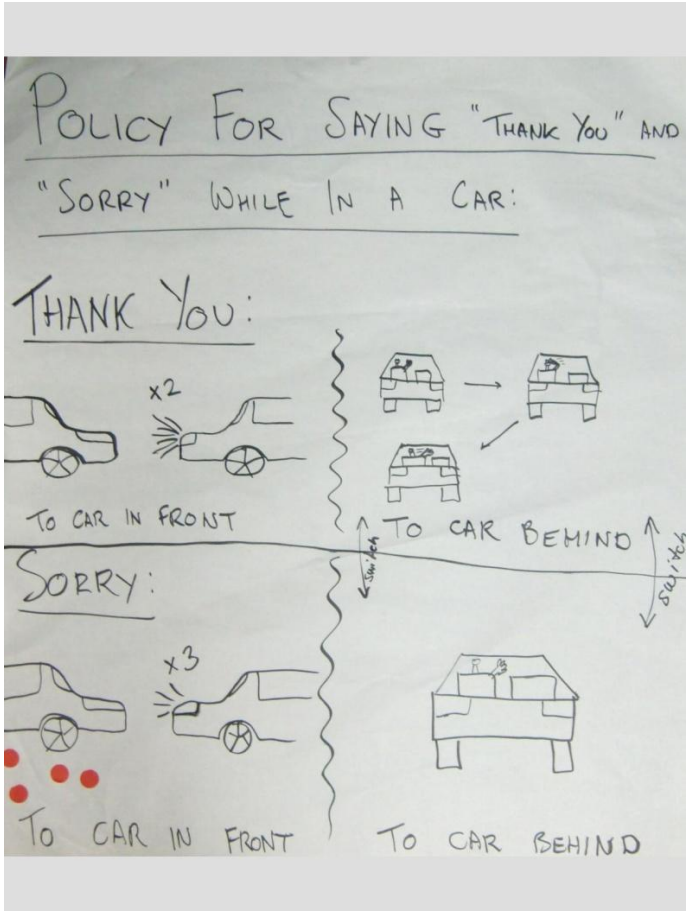
Your assignment is to design a policy to reduce the carbon intensity of vehicle fuel in California that accepts, or recognizes, what seems to be irreducible uncertainty in each fuel's GWI. What does it mean to be on the "safe" side? We require beams in buildings to be quite a bit stronger than they really have to be even though this makes buildings more expensive, because we think it's worse to have buildings fall down on people than to pay a little more for them. Airplanes, on the other hand, are made with smaller safety factors, because weight is much more costly for an airplane to carry around than extra structure in a building. Does this kind of "safety factor" philosophy apply in the fuels case?

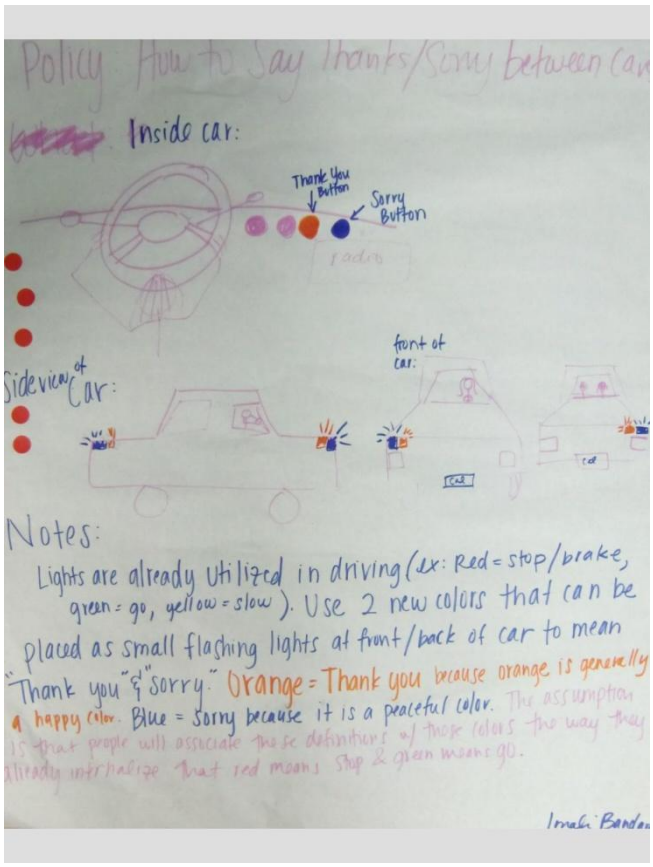
This is a difficult assignment; no government has really solved this problem to date. You will probably want to follow some of the citations in the papers listed here, and do some googling on your own, including research on regulation practice outside energy (does food and drug safety practice offer any ideas you can borrow? policing and crime control?) , to get an idea of the general problem. You can get to all of these papers through the library proxy server or a computer on campus. The

government web pages tell you much more than you need, or have time to absorb on this very technical problem, so you will need to browse them strategically.

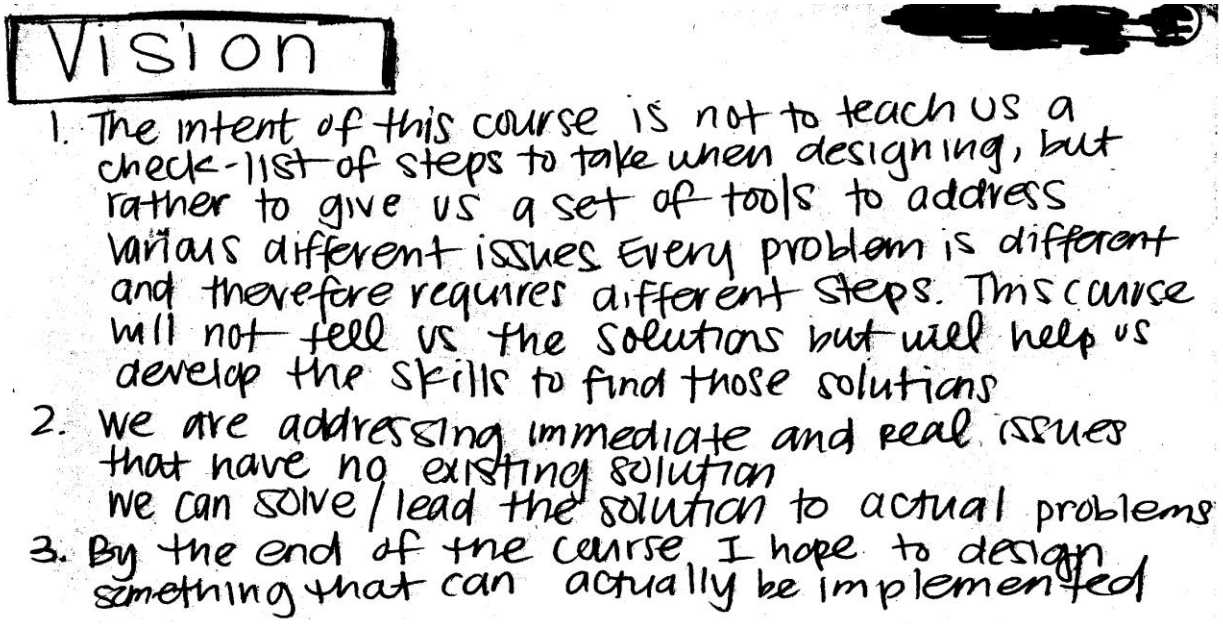
Notice that a carbon tax, with variations, which many people feel is the best overall approach to climate stabilization, doesn't solve the problem here, and neither does "command and control" regulation, though either might be more adaptable to deal with the uncertainty problem that the LCFS as it is.

III. Car courtesy projects




Policy: How to Say Thanks/Sorry between Cars
Inside car:
Thank You Button
Sorry Button
radio
Sideview of Car:
front of car:
road
car
Notes:
Lights are already utilized in driving (ex: Red = stop/brake, green = go, yellow = slow). Use 2 new colors that can be placed as small flashing lights at front/back of car to mean "Thank you" & "Sorry." Orange = Thank you because orange is generally a happy color. Blue = Sorry because it is a peaceful color. The assumption is that people will associate these definitions of these colors the way they already internalize that red means stop & green means go.
Imaki Bandon

IV. Vision statements



Vision

1. The intent of this course is not to teach us a check-list of steps to take when designing, but rather to give us a set of tools to address various different issues. Every problem is different and therefore requires different steps. This course will not tell us the solutions but will help us develop the skills to find those solutions
2. We are addressing immediate and real issues that have no existing solution
   We can solve / lead the solution to actual problems
3. By the end of the course I hope to design something that can actually be implemented

[redacted]

Vision

I came into the course expecting a focus on theory and tested application of those theories. I was pleasantly surprised when it turned out to be the complete opposite. Now, I'm eager to tackle problems and design policies that constitute a large system. What I mean, [redacted] is that the solutions I am interested in are those which affect whole communities. Citizen engagement on the level of all Berkeley residents rather than specific demographics, such as students.

1. intent?

[redacted]

to learn how to create a good policy or what makes a good policy. The process of it. The use of it. How to do it.

2 - excites me?

- policy
- ideas
- team work
- interactions
- process
- studio
- different
- creativity
- out of the box thinking/doing

*I learned a lot of theories, now I can use this theory and create something out of it.

3. true..

I want to come out of the end of the course & be able to know how to write/create a policy that works or how to make it work. Life applications.

4. Not sure yet. More background info on how to do it? How to create it? Why creating it? More real life applications.

[redacted]

I want to get an understanding of the questions I should be asking when developing a program or policy - what kind of research and thought process to go through as well as a grasp of what type and how much energy/time something would take.

- creativity
- group work
- brainstorming ideas in a non-committal way
- who are key players and how do they think

1) In my mind, the intent of the course would be to develop a framework and design method for creating effective policy and program. I see it as a course that allows the students to tackle really policy issues and develop policies and programs to address those issues.

2) What excites me about the class is the hands-on approach and projects. I like how rather than being told how to do something, we come up with ideas on our own.

3) What I want to be true is understanding ideas of design, engaging myself, my group, and the class to developing new and creative means for tackling issues and methods of design.

4) I want to improve on brainstorming different ideas, teamwork, and speaking in class.

[redacted]

[redacted]

1. I think the course is about designing "not only" learning to design but doing the actual design. I am really hoping that the design moves towards policy designs, coming up with new innovative & effective procedures, having the public, the govern- economical & social factors in mind.

2. What excites me? "Life"

3. At the end of this course I would like to be able to design what I call a Good policy. Something simple, just, fair & effective. Especifically around energy or public policies in developing countries.

4. I would like the cource to focus more on policy/procedure designs & the Implementation of these policies. I wanna make sure that the policies I will design are implemantable!, and effective.

Vision — [redacted]

(1) My intent in taking this course is to develop policy designs that are simple, elegant & at the same time meaningful, impactful, etc. My ultimate goal is to design a policy to Reduce auto-use and increase the competitiveness in life! of alternative modes of transport.

(2) Transportation, Land use, Cost overruns on infrastructure projects (especially rail). Also, Community development & City Planning.

(3) that Reducing Auto use through policy & planning is Possible!

(4) My ability to let go of problems & nitpicky details &