

# FYS Proposal for Fall 2006

## The Mathematics of Social Justice

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### 1 Course Description

#### 1.1 Brief Description

In this course students will investigate connections between quantitative literacy and fair solutions to issues in contemporary society. Broadly speaking, the course will take two related approaches to this theme. First, students will learn about economic and political issues that have quantitative bases, and explore how their own quantitative literacy aids them in understanding the origin and status of an issue, and in framing public debate regarding it. Second, we will examine the ways in which an individual's quantitative literacy affects the fairness of society's interaction with him or her.

Along the way, students will have the opportunity to explore the idea of quantitative literacy, discover the strengths and limitations of their own quantitative literacy, and identify the people and experiences they associate with the development of their quantitative literacy. Further they will be encouraged to compare their thoughts and experiences with those of their classmates and of individuals in the larger community through a service learning opportunity.

#### 1.2 Catalog Description

Alexander Hamilton said, "The first duty of society is justice." Today there is vociferous argument about the prevalence of justice. To what degree is our society just? Are there practical ways to make it more just? This course applies basic mathematics to controversial issues like elections and income distribution in an attempt to look at them objectively. Using mathematics that everybody is taught, we'll try to make sense out of conflicting opinions on these issues, so discovering the practical importance of a solid foundation in mathematics for everyone.

### 2 The Course's writing component

#### 2.1 Journaling

The course will include a journaling requirement. Among the themes that students will be asked to journal on are

- The origins of their own quantitative literacy
- Their opinions and impressions regarding issues developed in class
- Their service-learning experiences

I haven't figured out how I will grade this requirement yet, but certainly journal entries should serve as a source of inspiration for the formal writing assignments.

## **2.2 Short assignments**

I envision a fairly short written assignment due about two weeks into the class that is primarily introspective. This might ask the students to construct an argument supporting their beliefs concerning an issue, or it might be autobiographical, following the quantitative literacy theme. I am thinking of two or three pages with minimal revision but fairly extensive feedback. This is primarily to begin a conversation for the semester.

The next written assignment will be due around the middle of the term, and will engage the students in the writing process more fully. I plan for this paper to treat a fairly clearly delimited topic drawn from the course, perhaps the conundrum of discerning the will of the people in an election applied to the current American political climate, or the practical consequences of the increasing inequity of income distributions in the US. Regardless of topic, the students will be expected to meet with me to discuss the topic and identify a thesis, and meet with their WA for assistance in drafting the paper. I might encourage them to read one another's drafts so that they develop an ability to critically review another's work. In any case, this will be about a five or six page paper.

## **2.3 Final paper**

The final assignment for the course will be a long paper with a topic that the student will have substantial control over, but that will serve as a vehicle for synthesizing the various themes of the course. The topic will be expected to relate to material covered in reading and classroom discussion. It should draw on the service-learning experience the student has chosen, providing a venue for sharing the student's reflections on the activity and its relation to the rest of the course. The paper should require some scholarly research beyond the assigned readings for the course. This paper will build on the skills developed by the student in writing the midterm paper. I envision an outline that I review with the student followed by at least one draft reviewed by the WA before the final product is submitted for grading.

# **3 Fulfilling Program Guidelines**

## **3.1 Providing students with strategies for interpretation and evaluation**

A secondary goal for the course is to convey to students that they already know enough mathematics to understand arguments that are substantially more quantitative than those they will find in popular media. Refining their quantitative literacy fulfills this goal.

## **3.2 Challenging students' assumptions and biases**

The central goal of this class is to provide a means to transcend the partisan diatribe that occupies a large share of mainstream media by approaching the issues afresh and from a quantitative and objective viewpoint. Students with political opinions shaped by contemporary political discourse will need to carefully rethink their views, and consider whether data supports their opinions, and if so, assess its trustworthiness.

## **3.3 Encouraging the building of informed personal perspectives**

A quantitative approach to issues also necessitates a critical look at the limitations of quantitative constructs, and so the development of informed perspectives that acknowledge the utility and limitations of every point of view, no matter how thoughtfully evoked.

### 3.4 Developing research-oriented skills

Students should gain confidence in their ability to use the quantitative skills they bring to the class to analyze issues. Further, the final paper for the course requires library research. At least one class session will be devoted to developing the necessary skills.

### 3.5 Encouraging intellectual communities among students and faculty

This course will not address this goal in any unusual way.

## 4 Additional Comments

### 4.1 Rough Description

The course will begin with a construction of the mathematical basis for the idea of fairness; that is, we will explore the ways in which fairness can be viewed as a mathematical abstraction, and the difficulties and shortcomings of mathematical models of fairness in various contexts. The centrality of fairness as a justification for a free market democratic society will be developed through readings and discussion.

At the same time, students will reflect on their own mathematical experiences, and their ability to apply them to understand issues like those the course will address.

The first context in which a mathematical model of fairness will be considered is the fair division of fixed resources. This provides a fairly noncontroversial starting point for exploration of the connections between mathematical ideas and relatively simple real-world problems. It should be a comfortable starting point for the class. Parallel with this is an investigation into fairness as a basis for resolving conflict.

The next context is the fairness of various methods of measuring the outcomes of elections, which will lead into a richer and more realistic investigation of fairness in American elections. This includes examining and reflecting on the ability of a two-party democracy to successfully represent the interests of the populace, and the effect on democratic process of various methods of controlling and abridging voting rights.

From here the course will circle back to issues of fair division of resources once again, but make it more concrete by introducing the issue of income distribution. The abstract tension between distributing income according to need and according to contribution is made concrete by considering the actual distribution of income in the US and the world. The arguments for the current increasing disparity in incomes and for decreasing this disparity will be considered. The consequences of income disparity are the subject of much argument, so the students will sample some of the main themes.

After considering income, we will investigate the variety of ways that the free market allows exploitation of the quantitatively illiterate. Marketing and contracts that place consumers in economically unfavorable positions include lotteries and all forms of gambling, as well as a variety of sales techniques for a wide array of goods and services. The fairness of these practices will be considered.

Finally, the class will turn to mathematical education as a civil rights issue. Having seen that mathematics offers insights into a variety of issues of social justice, we will ask how to educate our citizens so that they can understand these issues and recognize and attain fairness in their economic dealings.

### 4.2 Partial and tentative reading list

- *Fair Division : From Cake-Cutting to Dispute Resolution* by Steven J. Brams and Alan D. Taylor ISBN 0521556449
- *Chaotic Elections! A Mathematician Looks at Voting* by Donald Saari ISBN 0821828479
- *The Winner-Take-All Society : Why the Few at the Top Get So Much More Than the Rest of Us* by Robert H. Frank and Philip J. Cook ISBN 0140259953

- *Paying for Inequality : The economic cost of social injustice* by Andrew Glyn and David Miliband, editors ISBN 1854890581
- *Radical Equations: Civil Rights from Mississippi to the Algebra Project* by Robert P. Moses and Charles E. Cobb ISBN 0807031275
- *Mathematics and Democracy* by Lynn Aurthur Steen, editor ISBN 0970954700