

2006-2007
Curriculum Development Grant Application



Name Narendra K. Jaggi Year of tenure-track appointment Fall 1991

Type of Grant Sought:

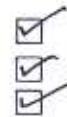
Individual

Group – please list additional member(s)

Course(s): "Energy and Society" (P120)

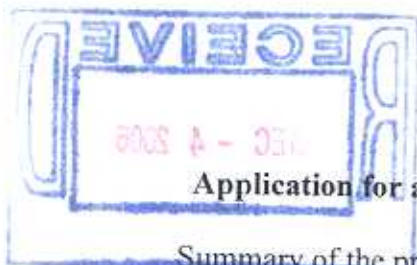
Please complete the following checklist by placing a check mark against each item to ensure that your application is complete. Incomplete applications will be returned to the applicant without further consideration.

1. Narrative (Not to exceed 3 pages, single space, Times Roman 12 point)
2. CD Budget Page
3. CD Grant Supervisor's Form



If your proposal is funded, would you be willing for the Mellon Center to use it as an exemplary submission in the online *Handbook*? Yes No

Signature Narendra Jaggi Date 12-4-2006



Application for a CD grant to develop a new course "Energy and Society" (Phys120)

Summary of the proposal:

I am currently (Fall semester of 2006-07) on sabbatical leave. Nonetheless, I have proposed, and the Curriculum Council has approved, that I shall teach, starting May 2007, a new course titled "Energy and Society" which shall be deemed to carry the General Education credit in the Physical Science Issues category. Even though the structure, the content and the pedagogy of the proposed course has been fully articulated—that is why the Curriculum Council has already approved it—a very significant amount of work will have to be done during the Spring semester of 2007 to plan the *specific* assignments, activities, field trips, and guest speakers. Among other things, I will need to make six to eight advance trips so that I, as the instructor, can fine-tune the reading assignments and the in-class discussions to maximize the effectiveness of those site visits. Since this is the first time I will be teaching an 'Issues' course, I will need to be especially thoughtful and purposeful in designing appropriate assessment tools for this course.

Proposed catalog description of the course:

This course will enable students to acquire a working knowledge of various energy technologies and the manner in which they interact with the environment. In addition to discussions of the fundamental science that underpins and enables these technologies, course work will include critical, comparative analyses of the different energy choices that we might make, both as individuals and as a Nation. In light of the inherent global nature of the environmental consequences of some of these technologies, students will be given opportunities to engage with ongoing global conversations about energy related issues.

Projected course content and teaching approaches:

One-half of this two-part course shall consist of an introduction to the scientific principles governing the generation, interconversion and transmission of various forms of energy, and the manner in which they interact with the environment. Students will also develop an understanding of the so-called scientific method. They will be required to be actively aware of (and discuss) the nature and extent of the errors of measurement, and also, the limitations of the models that are in use at any given time.

During this half of the course, the teaching approach shall consist primarily of lectures, experimental demonstrations, solving elementary technical problems in small groups, and computer simulations. These will be used to familiarize the students with various forms of energy: electrical, optical (including solar), mechanical (including wind and hydroelectric), chemical (including fossil fuels and biofuels) and nuclear (including fission and fusion.)

In the other half of the course, students will have firsthand encounters with the technologies, technologists, and thoughtful users involved in the generation, transmission and consumption

of energy. All students in the class will be given opportunities to research and discuss the many choices that can be made regarding our national energy policy.

During this portion of the course, the teaching approach shall consist of arranging *well-structured* field trips and site visits during which students will be able to have meaningful and in-depth discussions about the technical and socioeconomic aspects of energy related issues with knowledgeable experts and/or thoughtful users and activists. These visits will be followed by substantive reflection, both in writing as well as in-class discussions, so that students connect their books with this experiential component. We might also invite to our class a couple of scholars/businesspersons/activists who have thought about this weighty question.

Let me offer some examples of such visits. We will probably visit three out of the following five kinds of power generation facilities in the State of Illinois: solar-electric, wind-electric, nuclear, geothermal and coal powered. We will, almost certainly, take a field trip to a sustainable living community in Illinois. We might invite to our class the executive vice president of a biodiesel manufacturing company in Peoria, and discuss with him the potential and limitations of biodiesel. We might visit a computer science professor at the University of Illinois who is building, for demonstration purposes, an extraordinarily energy efficient, small home made of straw bales. Students will study, as a part of the course, various ways to improve the energy efficiency of homes and businesses, and then probably visit with staff members/volunteers of the Ecology Action Center in Normal, Illinois to learn from them how they share their knowledge with the community at large. They might even make a quick stop at the Children's Discovery Museum in Normal to see what energy related exhibits they have.

Assignments:

As I stated in the summary section at the beginning of this proposal, many of the *specific details* of the assignments and activities remain to be planned; in fact, that is the primary justification of the grant. So, the following list should be seen as tentative and under development, not as the syllabus of the proposed course.

One set of assignments will consist of solving a large number of elementary technical problems that involve the generation, transmission and consumption of energy. These assignments will include quantitative questions about power and energy in many systems of units (old British units that are still extant in the USA, the international SI units, food and fuel units), ideas of energy efficiency in various contexts and interconversion of energy from one kind to another. These assignments shall also address the elementary scientific principles in mechanics, electricity, optics and nuclear energy.

Another set of assignments will begin with taking a guided field trip to a number of energy generating facilities in central Illinois and to having conversations with the staff members and operators at these facilities. These might include solar-electric, wind-electric, nuclear, and geothermal and coal powered plants. After returning from the site visit, students will, as a part

of the assignment, try to reconcile the textbook claims about the particular energy generation technology with whatever they find during the field trip.

Another set of assignments will require that students, working in small groups, research newspapers and popular magazines in science, engineering, business, and economics, using Lexis-Nexis and other databases, to identify significant contemporary events, debates and issues related to energy technologies and their possible environmental impact. Each group will then make a focused and well-researched oral presentation to the class about one of these contemporary issues, events or debates.

Yet another assignment will consist of studying various ways to improve the energy efficiency of homes and businesses, and then visit with staff members of the Ecology Action Center in Normal, Illinois to learn from their experiences. They may, as a part of the assignment, be asked to conduct an energy audit of their living quarters, their parents' home or their classroom.

Additionally, the energy crisis of the Carter years and the corresponding attempts to legislate efficiency, ranging from speed limits to CAFE standards, provides historical examples of engaging discussions. The competing political and economic pressures for finding commercially viable alternate fuels, the tradeoffs between different energy technologies, and the dollar, environmental and political costs of choices were other examples of pertinent contemporaneous conversations that were embedded in science.

How the grant will assist me:

It will reimburse me for the following trips by car:

- (1) A trip to the sustainable living community in Stelle, Illinois.
- (2) A few advance trips to coal-fired power plants in Illinois.
There are 21 coal-fired power plants in Illinois to pick from. One of the closest ones is the Baldwin plant in Randolph County, but there are many factors that might affect my final decision: geography, size and scale, age of the plant, its contribution to the total load of mercury pollution, etc.
- (3) One advance trip to the nuclear power plant in Clinton, Illinois.
- (4) A few advance trips to wind-electric generation facilities in Illinois: a small one (10 kilowatt Bergey Wind generator) and a larger facility currently under construction in McLean County by Horizon Wind Energy. Their 'visitor's center' might not be ready by the time the course is offered for the first time, but the facility will be up and running.
- (5) A trip to Peoria to meet with the Executive Vice President of BMI, a company that is aggressively investing in Biodiesel generation in Illinois.
- (6) A trip to meet with Mark Wilkerson who is the regional vice president of Sunwize Technologies, a leader in solar panels and batteries.
- (7) A trip to see Professor Tim Wilhelm at Kankakee Community College to see his lab that integrates many of these ideas in a pedagogical setting.

The remaining balance of the grant shall be used to provide me with a modest stipend.

Curriculum Development Grant Budget

1. Estimated expenses (make sure to include a description of each of the expenses in the 2-3 page narrative). If you are requesting books or videos, please provide titles and approximate costs.

Item	Amount
mileage for 2 trips to Stelle, IL	\$100
mileage for 1 trip to Urbana, IL	\$50
mileage for 1 trip to Clinton, IL	\$50
mileage for 1 trip to East St. Louis, IL	\$150
mileage for 2 trips to Peoria, IL	\$100
mileage for 1 trip to Kankakee, IL	\$75
meals during these trips, if needed	\$125
Total	\$650

2. Stipend requested (see above text for specific requirements):

Name	Amount
Narendra K. Jaggi	\$1350
Total	\$1350

3. Total amount requested:

\$2000