

SEMINAR IN CRITICAL INQUIRY: NUCLEAR ENVIROETHICS IN THE TWENTY-FIRST CENTURY

David V. LeMone
Department of Geological Sciences
University of Texas at El Paso, El Paso, Texas 79968

ABSTRACT

The primary purposes of the university critical inquiry courses are to aid in the retention and academic success of the students involved in taking the courses. The course subject matter is faculty dependent and variable. "Nuclear Enviroethics for the 21st Century" is an attempt to develop a non-engineering, non-science major, entry-level course stressing the issues, responsibilities, problems, and promises presented by the utilization of nuclear-related systems and technologies. The benefits of these systems must be balanced against the risks created. The purpose of this course is to give a balanced view, both positive and negative, of the impact of these systems on the current and future status of our society (e.g., nuclear medicine, food irradiation, greenhouse gases, acid rain, fossil versus nuclear power, nuclear waste problems, safeguards, etc.). The basic assumption is that the average high school graduate who is not pursuing a degree in science and engineering should be able to assimilate the broad area of nuclear-related systems impacting the citizens of this century.

A useful, applicable outgrowth of the development of this course has been an appreciation of the potential impact of the geodemographic cluster analyses of marketing research. These cluster analyses, using available census data and other sources, are able to distinguish and classify individual groupings of the population based on geographic zip codes. In this course, they were utilized to verify modern mobility and diversity using the local zip codes as a geographic base. Modern America consists of a series of urban-suburban-rural villages where people live in distinct life styles. Companies are now able to take 281.4 million Americans and split them into different life-style clusters (e.g., Claritas 62 clusters). The clusters reveal how you live, what you buy, and the details of your life. They reveal political attitudes, media preferences, home selections, services, and tastes in everything from automobiles to snack foods. As a practical waste management application, these same data need to be examined around present and planned nuclear-related facilities and repositories. Know who your stakeholders are before you try to convince them of anything. If we are able to communicate to them the broad aspects of a nuclear age, we are accomplishing the task. Education of the public, our stakeholders, is critical to the acceptance or rejection of a coming nuclear century.

INTRODUCTION

The University of Texas at El Paso has become greatly concerned about the increasingly large numbers of students dropping out of higher education in their Freshman and Sophomore years. The university is in the process of trying to alleviate this retention problem with the initiation of a content-based, point-of-entry, basic course, Seminar in Critical Inquiry. This course is balanced between a selected standard academic subject and a rigorous, university-level skills, resources, and responsibility portion which is interwoven with the academic subject material. The central

topical academic theme of the many sections of the seminar course offered varies as the interests vary between the professors of the numerous departments of the colleges of the university. All seminar students are introduced to the dynamics, problems, and skills required for survival and success in the academic world. This introduction includes such broadly ranging items as familiarity with the current electronic-based library and the analysis of individual learning styles. Critical thinking, cooperative learning, and group interaction are particularly stressed.

Two approaches to this course have developed. The first organized, developmental approach to the seminar concept was the on-going, successful program called Circles of Learning for Entering Students (CircLES). CircLES takes groups of 20 to 30 first-entry, declared Science and Engineering majors and places them together into three classes: Seminar in Critical Inquiry, Mathematics, and English. The coordinating linch-pin for this three-component cluster of courses making up the CircLES program is the seminar course. The students in this seminar also have available to them the services of a student resource center, the Academic Center for Engineers and Scientists (ACES).

In the fall of 1999 a second variation of the Seminar in Critical Inquiry was developed for entering first year students in the colleges of Business, Education, Health Sciences, and Liberal Arts. The in-place seminar course of CircLES acted as the general model for the development of this new Seminar in Critical Inquiry. There is a separate state-of-the-art active computer learning laboratory (ATLAS) for all seminar students. This centrally located facility is accessible for late hour utilization. Seminar students have other major computer laboratories available for their use (e.g., Liberal Arts Center for Information Technology (LACIT)).

The evolutionary development of the seminar programs began with a series of successful, experimental one-hour pilot courses (e.g., Concepts of Sedimentation). These pilot courses, which were first offered in 1996, were an immediate outgrowth of the university's participation in the National Science Foundation sponsored program, Model Institutions for Excellence (MIE). As a result of the guidance and efforts by MIE, both versions of the seminar have succeeded. The seminars are now part of the university core curriculum.

SEMINAR IN CRITICAL THINKING COURSE STRUCTURES

The MIE-initiated CircLES program was first offered in fall of 1997. The CircLES program addressed three major areas of university concern: Learning Communities, Seminar Initiatives, and Orientation. CircLES molded these concerns into the seminar component of the cluster program. The CircLES Seminar in Critical Inquiry then became the driver for the three-component cluster program. The initial success of the program has been excellent based on a 13% (from 67% to 80%) increase in the retention rate of engineering and science majors. Members of each CircLES 20 - 30 student group, formed from first year entering students, are placed in the same Mathematics, English, and Seminar in Critical Inquiry courses. The student groups remain together, thereby giving them social and academic stability in their critical first year of university experience.

Each of the seminar courses of the CircLES program has a Science, Engineering, or Mathematics faculty member and a selected student peer leader for the course. The second variation of the

seminar allows the participation of faculty members from any discipline. Peer leaders in both variations of the seminar course act as an important interface between the students and the professor as well as acting as an assistant to the professor (Table I). Course subjects are selected at the discretion of the individual professor. Professors selected for seminar courses are chosen from submitted applications by a board of reviewers. Election is based on the validity of the subject matter and how well the applicant proposes to integrate the goals established for the seminar (Table II). Each professor is required to detail how the goals of the seminar are to be reached in the context of their course (Table III).

Seminar faculty members that are selected are expected to attend relevant workshops prior to teaching the course. As an example, I have attended four, 2 - 3 day major workshops. The first faculty workshop attended was consultant Dr. B. Barefoot's Introduction to Critical Inquiry which was held May 27 - 28, 1999. The second workshop was given before the Fall Semester (August 20 - 21, 1999); it was the first formal introduction into the aspects of Cooperative Learning. This workshop was attended not only by seminar professors, but also by the Peer Leaders assigned to the teaching professors.

Near the end of the fall semester (December 3 - 4, 1999), Drs. M. Smith and D. Ward coordinated an in-house workshop on the Critical Inquiry course. Most recently in late summer (August 7-9, 2000), consulting cooperative learning specialists Johnson and Holubek visited the nearby Las Cruces, New Mexico, region. They offered intense immersion courses in both Foundations of Cooperative Learning and Advanced Cooperative Learning. The August workshop courses came with two excellent texts [1,2]. It should be noted that the workshop backgrounds have been greatly enhanced by a series of optional faculty seminars offered throughout the year by the university's Center for Effective Teaching and Learning (CETaL).

Normally the courses have two texts; one is selected for the course subject and the second is a self-help collegiate-level text. The self-help text utilized by the CircLES seminars is uniform for all sections (e.g., Fall 2000 selection is *Becoming a Master Student* [3]). The CircLES seminars are in the process of continual change. Prior to the Fall 2000 semester, there was limited interaction between CircLES faculty in the three clustered courses. In the fall semester of 2000, the emphasis has been to try to mold the faculty members of the three-course cluster into an interactive faculty community. Such a faculty community, for example, has the capability of developing dynamic interactive subject matter modules between the disciplines to better interrelate the cluster concept.

The seminars, as stated, are in constant status of revision and evolution. As an example, one practice that has been significantly curtailed is the all-CircLES cluster seminar meetings. These meetings occurred periodically, with all sections meeting together for an inclusive lecture, usually on a specific university life subject. These all-inclusive CircLES seminars were made possible by the fact that all of the CircLES seminars meet at the same time of day on either Tuesday and Thursday (12:00 - 1:30) or Monday, Wednesday, and Friday (11:30 - 12:30). Unfortunately, not all lectures given last year were considered to be either germane or useful. Two to three meetings per semester are now considered to be sufficient for the external needs of the course.

SECOND SEMINAR IN CRITICAL INQUIRY COURSE STRUCTURE

The second Seminar in Critical Inquiry (Business, Education, Health Science, and Liberal Arts Colleges) has been derived directly from the MIE-initiated Engineering and Science CircLES program. It is also a further initiative of that MIE program. The author's personal experience is confined to this seminar series. The course concepts, goals, and general structure (Table II) parallel those of the CircLES program. Faculty applications and final course selections, for example, are made through similar channels. The major differentiation between the two programs is that the second series of inquiry seminars may be taught at any regularly scheduled time by faculty in any discipline and they are not in a cluster mode. Another major departure is the fact that there is no single self-help text designated. Faculty may choose between several texts [e.g., 3,4,5,6]. This is a logical decision when one considers the variability of the approaches and needs of these four other colleges of the university.

In the fall of 1999, the newly developed second seminar course in "Nuclear Enviroethics in the Twenty-first Century " was offered to a class of entering freshmen, all of whom graduated from high school in June of 1999. My reasoning and assumption was that the average high school graduate, not pursuing a degree in science and engineering, should be able to assimilate the broad area of nuclear related material impacting the citizens of this century.

The course description is as follows. The national and the global communities are faced with an increasing number of critical decisions involving nuclear and nuclear-orientated issues. These issues involve the utilization and/or exclusion of nuclear-orientated systems in such broadly diverse areas as nuclear armaments, medicine, and power generation. The benefits and security of these systems must be balanced with the risks that they create. The purpose of this course is to give a balanced view, both positive and negative, of the impact of these systems on the current status and future of our society (e.g., nuclear medicine, greenhouse gases, acid rain, fossil versus nuclear power, nuclear waste problems, safeguards, etc.). Today's university students will be making future decisions concerning these issues; they must be capable of making informed ones.

The texts selected for the Nuclear Enviroethics course were Murray's "Understanding Radioactive Waste" [7] and Gardner and Jewler's "Your College Experience: Strategies for Success" (YCE) [4] in addition to a series of handouts distributed throughout the semester. Krauskopf's text [8] was a useful backup to Murray. The selection of Murray's text was indeed a fortunate one. It is fundamental, direct, inexpensive, and exceptionally well written and illustrated. It gave an excellent foundation for the students in this class. If the nuclear power industry and those involved in nuclear medicine, industrial application, and research ever expect a public understanding of their importance to our society, it has to be through communication with the stakeholders. In my personal opinion, an expanded and updated version of Murray's text is a inexpensive solution to the problem. I found three other resource texts useful in addition to the YCE text. Adler and Van Doren's volume [9] on reading has been around a long time and is still an excellent approach. I would also add Piccitto's critical thinking approach [10] and the Weiss clustered world text [11].

The broader seminar primary goals are the same five-fold as those for the original CircLES seminar [12] (Table II). The first goal is to strengthen the students' academic performance and

facilitate the transition to the university. The specific objectives of concern under this goal are for the student to explore one or more academic topics and to become aware of and practice the habits of scholarship. The students should become familiar with major university academic policies and requirements. Lastly, students will need to examine personal and social transition issues affecting college success, which may include such topics as academic expectations, high-risk behaviors, and relationships. The remaining four goals are to enhance the students' essential academic skills; to increase student/student and student/faculty interaction both in and outside of the classroom; to encourage students' self-assessment and goal clarification; and to increase students' involvement with university activities and resources. Obviously, each one of these goals has a number of specific objectives that need to be addressed. Faculty in the seminar courses are expected to address how the goals and objectives are to be met before the course is accepted. A specific seminar course evaluation was given at the end of the term. A syllabus is also a standard requirement. Table III lists the response of how the goal problem will be addressed in the spring 2001 course in "Nuclear Enviroethics in the Twenty-first Century."

COURSE SYLLABUS

The course syllabus is subdivided into two series (Tables IV and V). The discipline component syllabus (Table IV) divides the course into three segments, utilizing Murray [7] as the framework. Coincident with the course, the Tokaimura nuclear criticality incident occurred in Japan (September 30, 2000). It was followed by the class through press and internet developments. This year it will be taught using the IAEA report on the subject. It is always fortunate to have something happening concurrently or locally. The late 1983 Juarez Yonke Fenix Scrapyard incident (6000 Cobalt-60 pellets), for example, has proven to be most useful, as some of my students live across the border in that sister city.

One problem that has been encountered with the students is that they have no real, or at best a limited sense of history. Three Mile Island does not register with them; the Second World War and the nuclear bombing of Hiroshima and Nagasaki are only vaguely comprehended. In their defense, it must be said that the students do understand what is happening currently. Problems such as global warming, the Kyoto protocol question, and the problem of future fossil fuel energy versus nuclear energy are understood, if somewhat fuzzily.

The most important thing in a controversial course of this type is to give an even-handed view of the subject matter. You balance Chernobyl with the fact that the chances are one out of three that you will be using a radioisotope in the hospital. You try to give them the feel for the problems, dangers, and promises of nuclear disarmament treaties and international safeguards. At the end of the course, they have a concept of the nuclear fuel cycle, natural analogs, Russian and American legacy wastes, nuclear waste classifications, types of waste repositories, etc. I think they have acquired a fundamental knowledge of the area. I see no reason why you could not teach any normal stakeholder the fundamentals of the subject in 22-24 hours of instruction.

The second required text used for this course was "Your College Experience: Strategies for Success" (YCE) [4]. In class, it was taught with an introductory session that was immediately followed by library and computer sections (Table V). This worked well for the students. However, at the end of the course they thought that the most important part of this half of the

course was the section on time management, closely followed by the sections on lectures, textbooks, and grades.

One of the items that is very important for the students to cover in this course is the knowledge that everything written in a text or seen on television is not always correct. This requires critical thinking and recognition of the influence (or propaganda) produced by the written word. The best things I have found to use for examples are the reports issued by different nations and groups on the same subject. As you might suspect, for example, the Tokaimura incident would be reported quite differently by the New York Times, the Sierra Club, the Japanese government, and the El Paso Times. The ability to recognize what kind of influence is being used on you is essential. Today almost everything with environmental parameters tends to be ranked in importance on the basis of first politics, second the law, and lastly technical assessment. Areas of responsibility, of course, are always in the reverse order.

Fully a third of the syllabus for YCE (Table V) is concerned with non-academic activities with which the university student is in constant contact, such as relationships, diversity, stress, and money management. These subjects are often relegated to the status of being "touchie-feelie." The Peer Leader's evaluation of what subjects deserve to be stressed in this area is invaluable to the seminar instructor. In cooperative teaching you periodically randomly divide the class into groups of three or four. These groups then tackle different problems such as the ranking of dangerous substances from least harmful to most harmful (e.g., cigarettes, alcohol, marijuana, heroin, and cocaine). You would not believe the ranking order for cigarettes and alcohol that came out of some of the groups. I also rely on the formal university program DISCOVER as an aid to student determination of career choice. Additionally, Alcohol 101, a very good interactive program for students, is strongly recommended (Table III).

Certainly not everything that was tried in this course was successful. The most notably difficult task was to develop some enthusiasm for either environmental laws or using government documents as a source. This is a very satisfying experience for graduate students, but not for entering freshmen. It can be made more palatable when intermixed with major law suits and local problems (e.g., environmental justice and the siting of low-level radioactive waste repositories). Conversely, the students were actively responsive to the areas of the global warming, acid rain, and the related environmental impacts of fossil fuels versus nuclear fuels. The area of least familiarity seemed to be in the awareness of the non-power utilization of radioactive technology. The comprehension of the majority of the students seemed limited to a vague comprehension of its use in cancer therapy. The familiar smoke detector is a good place to initiate a discussion on this subject.

In the skills area of this seminar, there was also some success in developing an exercise on diversity utilizing geodemographic clusters. It would seem reasonable that this application on clusters could be adapted also for use in nuclear waste management.

DIVERSITY AND THE CLUSTERED WORLD

It is very appropriate to view the modern concepts of diversity through the kaleidoscope of the clustered world we now inhabit. Cluster analysis, in this context, is a subset of geodemographics,

which is in the business discipline of marketing science. Cluster analysis seeks to analyze and predict what you are like, what messages turn you on and off, and how you think. Weiss, who has written the fundamental, non-specialist volume [11] for this area, points out that in the 1990 census, there were reported some 300 races, 600 Indian groups, 70 Hispanic groups, and 75 ethnic combinations. These would seem to validate the perception of diversity. Unfortunately, it misses the main point of diversity, life style.

The pioneer broad-based organization in cluster analysis was Claritas. They started with 40 clusters of life styles in the eighties based on their analyses. Claritas and its PRIZM system today divide the 281.4 million people in America into 15 social groupings of the basic 62 life style clusters [11]. The major key has been the U.S. Census Bureau data. These data are enriched with such items as private market research surveys, public opinion polls, point-of-purchase receipts, on line data, etc. These 62 clusters will reveal how you live, what you buy, and your life style. Membership in your cluster classification indicates that you will buy the same products, media, services, automobiles, homes, etc. It determines whether you prefer Knudsen's low-fat cottage cheese or Kraft Macaroni and Cheese. You will have the same political attitudes and entertainment tastes. This certainly was not lost on the Clinton-Gore campaign that targeted the swing voters in the 1996 election. Along with the Perot factor, this won the presidency for the Democrats. It will be interesting to see the post-mortems of the 2000 election.

Claritas has catchy, descriptive names for each of the 15 social groupings (e.g., Elite Suburbs, Urban Midscale, Working Towns, etc.) and each of the 62 geodemographic clusters (e.g., Kids and Cul-de-Sacs [Upscale suburban families], Latino-America [Hispanic middle-class families], Rural Industria [Low-income blue-collar workers], etc.) [11]. These data have been used for political advantage, by universities to gain students for retention, car and truck sales, etc.

The simple fact of life today is that the concept of America is no longer the melting pot it originally was. We live in a nation of urban-suburban-rural villages inside individual telephone zip codes, which now define our modern geography. As Weiss [11] points out, you say oil to someone in the Winner's Circle cluster, and it means extra virgin olive; you say oil to someone in Rural Industria cluster, and it means Quaker State. The concept of Mass Marketing, like personal privacy, appears to be dead. Today, specific targets are the answer in every aspect of business, advertising, politics, and life in general.

In addition to Claritas and its PRIZM system, other international cluster analysis players include Canada's Compuserve with its PSYTEUSA system and Europe's Experian and its MOSAIC system [11]. These two other organizations develop different analytical styles of the basic data, and consequently, seem to end with different names and numbers for the clusters. Some of these clusters may be easily related while others will be difficult, if not impossible, to make equivalent. The English-based Global MOSAIC is considered to be the top cluster group organization on a worldwide basis. They track 19 countries that have an aggregate of 631 clusters, which may be distilled into 14 basic global life styles. This clustering analysis is of only 800 million people, but this group produces nearly 80% of the world's gross domestic product [11].

While these are an interesting series of observations by Weiss, how do they fit into the class of Nuclear Enviroethics? Very simply, in an easily developed exercise utilizing the zip code

clusters of the El Paso metropolitan area. The university is referred to often as a subway college, with the bulk of our students coming from El Paso and Juarez. You copy the local zip code map from telephone book. Look up the characteristic clusters of each zone at the Claritas internet web site (You are where you live). El Paso, for example, has some 15 primary clusters distributed unevenly in a series of enclaves, barrios, or villages across the city. Meeting the class you hand out typical zip code areas of the city for an accuracy critique by the students. Ask them where they would locate an upscale jewelry store and a new Taco Bell in the city. The next two take-home questions you pose are, how has your zip code cluster changed in your lifetime, in your parents' or an older resident's lifetime? The result of this exercise is a clear understanding of the mobility of the population and the stability and relative uniformity of the clusters.

CONCLUSIONS

There are three major conclusions that can be made from this study. The first is that the MIE-initiated seminar programs at the university have been proven to be successful for entering students. The jury is still out on the cluster-of-courses concept of the CircLES program. The logistics of running the CircLES three-component concept outside of the Engineering and Science Colleges would seem to be insurmountable and likely counter-productive. These seminar programs will require another year or two to gage the success of the system. The second variation of the seminar is experimenting with learning communities that combine different closely related subjects (e.g., Seminar, English, Political Science).

The second conclusion is that it is possible to teach non-Engineering and Science Freshman students Nuclear Enviroethics. The addition of the other dimensions of the nuclear system not connected with the fuel cycle is necessary and has proven to be particularly successful (e.g., nuclear medicine, greenhouse gases, acid rain, irradiation of foods, fossil versus nuclear power, nuclear waste problems, safeguards, non-proliferation, etc.). The majority of my students and, most likely, the majority of the stakeholders, have little comprehension of the dimensions and the benefits that are derived from nuclear technology. This message needs to be taken to the stakeholders. Until this is done, expect to see little progress in nuclear waste management.

The final conclusion of the study concerns the impacts raised by geodemographic cluster analysis. Most of the problems that we encounter in life are those that we create when we pay no attention to someone else. That occurs when you ignore to whom you are talking to and when you don't pay attention to what they are saying. Perhaps listening has become a lost art today. However, if you are planning to influence the stakeholders of this world, you had better listen to what they have to say. Even more critical, you better know who they are. The real use of cluster analysis is in understanding the stakeholders that you are dealing with. This is particularly critical around either present or proposed nuclear cycle facilities and repositories. Who do you know in the nuclear fuel cycle that has the slightest idea of what clusters are in the zip codes around their facilities? It is sincerely hoped that this concept is being utilized; if not, let it at least be examined as an effective means of communication. It should be expected that Experian's MOSAIC system would be in place and effectively being used in the various European nuclear power states such as Great Britain, France, and Germany for the same reasons that we would find it useful in the United States.

If you know where people are coming from, you can connect with them. The nuclear power industry and the related multifaceted nuclear technologies have to consider the fact that if they ever expect to be accepted, they have to reach the people. In a sense, it is huckstering or advertising; if you are sensible you will use it to great effect.

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Table I. Job Description University 1301 - Peer Leader

1. Collaborate with the assigned course instructor to provide instructional leadership for University 1301.
2. Attend ALL University 1301 training activities (approximately two hours every two weeks).
3. Meet weekly with your assigned course instructor to assist her/him in planning the curriculum and instructional activities, both before the course starts and throughout the semester.
4. Attend all classroom sessions (three hours per week). Assist with grading if asked by course instructor.
5. Hold a minimum of two office hours per week to be arranged in cooperation with your course instructor.
6. Coordinate with your course instructor to meet with each seminar student outside of class at least twice during the semester. This time period should be used to monitor the seminar student's academic progress and to intervene with appropriate recommendations that could assist with the student's retention and success at the University of Texas at El Paso.
7. Participate in bi-monthly meetings of University 1301 peer leaders.
8. Support and participate in the evaluation process of the University 1301 program.
9. Monitor students' academic progress and make necessary referrals when appropriate.
10. Help students become independent learners.
11. Publicize and support the academic policies and standards of University of Texas at El Paso.
12. Model good student behavior.

Table II. University 1301 Goals and Objectives

Goal 1. To strengthen students' academic performance and facilitate their transition to college

Objective 1.1 Students will explore one or more academic topics to become aware of and practice the habits of scholarship.

Objective 1.2 Students will become familiar with major university academic policies and requirements.

Objective 1.3 Students will examine personal and social transition issues affecting college success. These could include topics such as academic expectations, high-risk behaviors, and relationships.

Goal 2. To enhance students' essential academic skills

Objective 2.1 Students will engage in critical thinking/problem-solving activities.

Objective 2.2 Students will practice oral, written, and electronic communication skills.

Objective 2.3 Students will conduct library and electronic research.

Objective 2.4 Students will examine and develop academic survival and success strategies (e.g., note-taking, active reading, time management).

Goal 3. To increase student/student and student/faculty interaction both in and outside of the classroom

Objective 3.1 Students will meet at least twice with the course instructor to discuss academic progress and transition to university and to explore options for improvement.

Objective 3.2 Students will participate in group activities and learn more about group roles and facilitation skills.

Goal 4. To encourage students' self-assessment and goal clarification

Objective 4.1 Students will participate in at least one activity to assess learning styles and relate them to college tasks.

Objective 4.2 Students will participate in at least one career assessment activity that examines the student's interests, abilities, and values.

Goal 5. To increase students' involvement with university activities and resources

Objective 5.1 Students will attend/participate in social, cultural, and intellectual events at university.

Objective 5.2 Students will become aware of and use selected academic and student support resources.

Table III. Goals for Seminar in Critical Inquiry:
Nuclear Enviroethics in the Twenty-First Century

Goal 1. Strengthen students' academic performance and facilitate their transition to the university.

1. Time Management Keystone: Day tracking and weekly and semester planning.
2. Personal Learning Styles: Determination, analysis, and application academically.
3. Lectures: Their modes and necessary preparation, note taking, revision, and organization.

Goal 2: Enhance students' essential academic skills.

A. Critical Thinking and Problem Solving:

- Practice of critical reading and analysis of the written agendas of industry, government, environmentalists, and stakeholders.
- Recognition of factual material from inferences and biases.
- Problem solving by evaluation for importance and necessity of solution (e.g., selected short-lived radio-pharmaceuticals).

B. Oral, Written, and Electronic Communication:

- Oral presentations individually and by group.
- Journal writing (due weekly for evaluation).
- Group and individual written assignments.
- Requisites of planning, organization, drafts, and final term paper documents.
- E-mail addresses for all students with an e-mail assignment requiring the construction of a resume.
- Completion of a basic Microsoft Excel exercise.

C. Electronic and Library Research:

- Library orientation and computer search (led by library staff member).
- Dewey decimal and Library of Congress cataloging systems.
- Referencing Protocol: Standard and Electronic.

D. Study Skills:

- Learning from articles and books: Systematic pre-reading, organization of content, critical analysis.
- Note-taking decisions in reading: Underlining, highlighting, graphics, and personal notes.
- Test structural analysis: Preparation (individual and groups), type (mathematical, multiple choice, essay), time frame available, key words, and post-mortems.
- Special problems inherent in preparation, organization, and comprehension of mathematical and science disciplines study patterns and examinations.

Goal 3: To increase student/student and student/faculty interaction both in and outside of the classroom

1. Classroom instructor/student protocol.

2. Interviews:
 - a. Instructor scheduled interviews:
 - Time management: Review weekly and semester planner to determine the validity of the necessary balances between academic, social, family, and work responsibilities.
 - Career path and requisite catalogue planning.
 - Course evaluation.
 - b. Peer facilitator scheduled interviews;
 - Primarily concerned with the holistic problems and progress of individual student.
3. Students will be required to select one of the following:
 - a. Complete the University's interactive Alcohol 101 program.
 - b. Paper on relationships and their responsibilities.
 - c. Paper on academic and personal stress relief methods.
 - d. Paper on personal money management.
4. Class group discussions on the El Paso geodemographic cluster diversity dynamics.

Goal 4: Encourage students' self-assessment and goal clarification.

Encourage students' self assessment and goal clarification,

1. Require completion of the Counseling Center's interactive Discover program.

Goal 5: Increase students' involvement with university activities and resources.

Increase students' involvement with university activities and resources.

1. Visit campus resource (e.g., Health Center, Museum, ACES). Student will give a written report.
2. Participate in at least one university activity (e.g., music concert, film series, sporting events, lecture series). Student is to turn in an evaluation of the event that will prove attendance; a critique is required.

Table IV. Nuclear Enviroethics Content Syllabus
Raymond L. Murray, 1994. Understanding Radioactive Waste

- Week 1 Nuclear Energy Utilization and Isotopes, Radioactive Waste Disposal, Nuclear Blackmail and Terrorism
- Week 2 Radiation and Radioactivity, State, National, International Law and Regulations [Introduction]
- Week 3 Commercial Fuel Cycle Wastes, Military and Defense Wastes, Medical, Industrial, and Research Wastes
- Week 4 Examination I
- Week 5 Classification of radioactive wastes United States and IAEA, Spent Fuel [US and International], Storage of Spent Fuel
- Week 6 Reprocessing [MOX], Recycling, Breeder Reactors, Partitioning, Transmutation, Mine and Mill Tailings
- Week 7 Mill Tailings, Radon, Transportation, Health Safety, and Environmental Protection. Multiple Barriers Concept, Long-Term effects, Natural Analogs
- Week 8 Examination II
- Week 9 Generation and Treatment of Low-Level Radioactive Wastes, Disposal of Low Level Wastes, Assured Isolation Facilities, Site Selection, Compacts and the Texas Compact
- Week 10 Disposal of Defense Wastes, Low Level, WIPP [TRU Waste], Vitrification
- Week 11 Disposal of Spent fuel and High Level Waste, Yucca Mountain, International Repositories
- Week 12 Geological Media and Characterization, Laws, Regulations, and Programs
- Week 13 Societal Aspects of Radioactive Wastes, NIMBY, Shareholders, Safeguards, Non-Proliferation, Disarmament
- Week 14 Term Paper Due, Medical, Industrial, and Research Applications, Ethics
- Week 15, Dead Day, No classes
- Week 16, Final Examination

DISCLAIMER: This syllabus does not represent a formal contract over lecturing, grading, or subject timing. It does represent my intentions as a course outline at the start of this course. It may be either expanded or contracted dependent on your perceived progress. Any radical changes will be discussed in class sessions.

Table V. Nuclear Enviroethics: Your College Experience Syllabus
J. N. Gardner and A. J. Jewler, 2000. Your College Experience

Week 1	Introduction Nuclear Ethics and Responsibility YCE 1 [College, Goals, Journal requirements]
Week 2	YCE 9 [Library, Electronic Databases]
Week 3	YCE 10 [Computer, E-mail] Library Orientation, Science Librarian Lecture
Week 4	YCE 2,3 [Active Learning, Critical Thinking]
Week 5	YCE 1,2,3,9,10 Journal and Exercises due
Week 6	YCE 4,5 [Time Management Styles]
Week 7	YCE 6,7,8 [Lectures, Textbooks, Grades]
Week 8	YCE 11,12 [Orals and Math and Science]
Week 9	YCE 4,5,6,7,8,11, and 12 Journal and Exercises due
Week 10	YCE 13,14 [Careers, Courses, Ethics]
Week 11	YCE 15,18 [Relationships, Sex]
Week 12	YCE 16 [Harassment and Diversity]
Week 13	YCE 17,19 [Stress, Alcohol, and Drugs]
Week 14	Thanksgiving Holiday, No classes
Week 15	YCE 20 [Money Management] Journal and Exercises, YCE 13,14,15,16,17,18,19, 20 due