

Southeast Missouri State University
School of University Studies

Department(s): Variable
Title: Capstone Experience

Course No. UI450
New Fall 2002

- I. **Catalog Description and Credit Hours of Course:** Group-based solution of open-ended problems based on "real world" scenarios requiring interaction among students with diverse training. (3 credit hours)

- II. **Interdisciplinary nature of the course:** The disciplines interacting will vary from section to section. Each section will approach a specific problem or scenario that has been developed by faculty and approved by a committee within the College of Science and Mathematics. Criteria for proposals will specify that at least two disciplines represented by different departments be involved. Common to all the sections will be the need for effective written and oral communication on scientific and mathematical topics among team members with diverse backgrounds. Each section will include training in and evaluation of written and oral communication by the participants in the context of the group environment (see Objective 3 below for details). Briefly, the case studies will serve to train students in effectively working in a group and in typical methods used to schedule a project and to report progress on it. For example, role-play or fishbowl exercises may be used to teach effective conflict management within the group. Basic instruction in style and tone for progress reports and then asking students to produce reports for the case study will develop written and oral communications skills. The role-play or fishbowl exercises and the oral and written reports on the case studies will be evaluated. The skills developed from the case studies will then be applied during the course of the main project. The effective functioning of each student group, and the quality of students' written and presentation products will depend on their successful integration of the perspectives of Individual Expression and Natural Systems.

- III. **Prerequisite(s):** Completion of the University Studies Core Curriculum and senior standing in one of the disciplines specified for the particular section. Additional prerequisites may be required for particular sections.

IV. Purposes or objectives of the course: The course is intended to provide students with an experience simulating that of professionals in their major disciplines, whether in industry, business, or academic research. Each section proposal will be evaluated both for its requirement of rigorous application of scientific or mathematical skills and knowledge as well as the extent to which the project is interdisciplinary. Individual sections will have purposes and objectives specific to the content areas addressed and the nature of the particular problem. Every section, however, will address these common objectives:

- A. Oral communication: (US Objectives 1, 2, 3, 6, 7, 9)
 - 1. Students will use effective oral communication skills to communicate with group members.
 - 2. Students will make presentations appropriate to a general audience regarding their progress and proposed solutions to problems.
 - 3. Students will orally present design alternatives or questions to a general audience and solicit necessary input.
- B. Written communication: (US Objectives 1, 2, 3, 6, 7, 9)
 - 1. Students will compose written progress reports that are suitable to a general audience.
 - 2. Students will use written memos to record progress, solicit information, and suggest approaches within their groups.
- C. Natural systems: (US Objectives 1, 2, 6, 7, 9)
 - 1. Students will apply background knowledge from their major disciplines to identify issues pertinent to the problem.
 - 2. Students will apply content and methods from their major disciplines to propose possible solutions to the problem.
 - 3. Students will apply content and methods from their major disciplines to develop a solution for the problem.
 - 4. Students will devise experimental, modeling, application, or verification approaches and test the efficacy of proposed solutions.

V. Expectations of students:

Each student will:

- 1. Attend class meetings and group meetings.
- 2. Complete assigned tasks within the group in a timely manner.
- 3. Participate effectively in the preparation of written reports and presentations.

VI. Course Outline:

Activity	Hours
A. Introduction (US Objective 1) 1. Introduction of problem 2. Clarification of expectations and processes 3. Survey of information resources	3
B. Communications (US Objectives 3,9) 1. Introduction to writing styles and audiences 2. Oral communication within and outside the group 3. Group organization and project management	3
C. Case study or studies with emphasis on problem-solving strategies, group dynamics, oral and written communications (US Objectives 2, 3, 6, 7, 9)	6
D. Group work on main project, including periodic meetings with instructor, oral and written progress reports (US Objectives 1, 2, 3, 6, 7, 9) 1. At the beginning of the project, task assignments and a schedule will be established 2. Weekly group meetings will be held with the instructor. Copies of notes and action items from all other group meetings will be submitted at these meetings so the instructor can monitor and discuss progress. 3. Formal written progress reports will be submitted every three weeks. 4. Formal oral progress reports will be presented every three weeks.	30
E. Oral final reports	3

VII. Textbook:

Supplementary textbook as appropriate for particular sections.

VIII. Basis of Student Evaluation:

1. Written and oral reports on case studies	20%
2. Written progress reports on main project	20%
3. Oral progress reports on main project	20%
4. Final written and oral reports on main project	40%

IX. Justification for Inclusion in the University Studies Program:

Objective 1: *Demonstrate the ability to locate and gather information.*

Emphasis: significant

Content: Each section must include a problem requiring extensive outside information for solution. The resources to be used will vary according to the problem. One class period will be used to introduce students to appropriate resources formally. Instructors will work with students to guide them in further resource exploration as required.

Teaching Strategies: During the case study or studies, students will report on the stages of solving the problem, including background for the problem and sources for information pertinent to solutions. These will be critiqued by the instructor and will serve as models for information gathering in the main project.

During the main project, the instructor will meet periodically with each group to review progress and offer assistance. Students are expected to identify information needed and search for it in appropriate media; the instructor will review the information located at group meetings, evaluate its appropriateness and completeness, and offer suggestions as necessary. Students will propose methods for collection of data to evaluate possible solutions during testing, and these will be reviewed and critiqued by the instructor.

Student Assignments: Case studies will require problem reports and solution reports, including reviews of pertinent information. Each main project progress report will include a review of published information to which the group has referred, as well as information obtained from testing proposed solutions.

Student Evaluation: A portion of the grade assigned for each case study, project progress report, and final report will be awarded for the completeness and appropriateness of the information gathered by the students.

Objective 2: *Demonstrate capabilities for critical thinking, reasoning and analyzing.*

Emphasis: significant

Content: During introductory and case study sessions, techniques of analyzing problems, generating solutions, and verifying solutions will be presented by the instructor. These may include methods such as brainstorming, task division, experimental or testing methods, etc.

Teaching Strategies: In addition to introductory lectures, critical thinking will be taught in interactive group sessions during the case studies. For instance, a group may lead a fishbowl discussion in which appropriate critical thinking activities are modeled, followed by discussion with the whole class. Evaluation of critical thinking in case studies will provide students with the opportunity to modify their techniques for the main project. During the main project, the instructor will meet frequently with each group. During

these meetings the students will describe the ongoing process of problem analysis and solution, and the instructor will offer immediate feedback.

Student Assignments: At least one case study will be assigned in which students must formally report both orally and in writing on the processes used to analyze the problem, generate possible solutions, choose a focus, develop the solution, and verify the effectiveness of the solution. The main project will include progress reports and a final report covering the same components.

Student Evaluation: The critical thinking shown in the case studies, progress reports, and final report will be a major portion of the grades for these assignments.

Objective 3: *Demonstrate effective communication skills.*

Emphasis: significant

Content: The instructor will provide instruction on writing appropriate to the specific project in one of the lectures early in the course. Formal instruction will be provided on how to conduct effective oral communication, both among group members and in reporting progress to target audiences. In the introductory lectures and in case studies, conflict management techniques will be introduced. Students will be instructed in presentation software such as Power Point use as a tool in formal oral presentations.

Teaching Strategies: Case studies will include written and oral reports. During the case study or studies, student groups will conduct fishbowl discussions, after which the oral communication within the group will be discussed in the class as a whole. The instructor will meet with each group frequently during the main project, and the group members will report orally on their progress. The instructor will have an opportunity in these meeting to provide direct feedback on the oral reports.

Student groups will prepare written progress reports for each project during the semester, followed by a final report. The progress reports will be identical in format to the final report, serving in effect as drafts of the final report. Each progress report will be evaluated by the instructor for effective communication and returned to the group, allowing re-writing between successive versions.

Student Assignments: Case studies will include both written and oral reports. Written and oral project progress reports on the main project will be made during the semester, and each group will present a final oral and written report on the main project.

Student Evaluation: The written and oral reports on the case studies, the written and oral progress reports on the main project, and the final written and oral reports on the main project form the sole basis for grading in the course. Although communication skills will obviously not be the only factors used to determine these grades, effective communication skills on the part of the students will form the basis for making the judgments on the other factors, so the importance of effective communication skills for success in this course cannot be overstated. Oral reports will require participation by all group members, who will be evaluated for oral presentation separately. Students will

evaluate the contribution of each group member in their own group, allowing both group and individual evaluation of written reports.

Objective 4: *Demonstrate an understanding of human experiences and the ability to relate them to the present.*

Emphasis: None

Content:

Teaching Strategies:

Student Assignments:

Student Evaluation:

Objective 5: *Demonstrate an understanding of various cultures and their inter-relationships.*

Emphasis: None

Content:

Teaching Strategies:

Student Assignments:

Student Evaluation:

Objective 6: *Demonstrate the ability to integrate the breadth and diversity of knowledge and experience.*

Emphasis: Significant.

Content: Varies with individual section. Each proposal will be evaluated for the interdisciplinarity of the problem addressed. Each section will use one or more case studies as training examples, and these case studies must require integration of methods and content from the appropriate fields. Introductory lectures will include an outline of the disciplines required, and examples of integrative approaches to problem solving.

Teaching Strategies: In addition to the introductory lectures, case studies will be used to train students in integrative problem-solving.

Student Assignments: At least one case study will be assigned in addition to the main project. In both of these, students will be required initially to report on the methods and content areas of the disciplines involved. In progress and final reports the students will be required to describe the ways that methods and content from different disciplines have been used in the process.

Student Evaluation: In the case study reports, progress reports, and final project reports, demonstration of integration of the disciplines involved will be explicitly assessed as one of the criteria for grading. The contribution of individual members to group work will be assessed by requiring peer evaluations of group members.

Objective 7: *Demonstrate the ability to make informed, intelligent value decisions.*

Emphasis: Considerable.

Content: Prior to the initial case study or studies, the instructor will explicitly describe issues in valuing that arise in problems parallel to the one undertaken in the specific

section. These should include the generation of criteria for deciding on the "best" solution for a problem, with attention both to internal criteria such as effectiveness and cost, as well as external criteria such as environmental, social, and political impact.

Teaching Strategies: In the case study or studies, students will be required to generate and weight criteria for assessing solutions. Instructor feedback on the case study will help to guide students in the parallel process in the main project. During the course of the main project, the instructor will provide feedback during periodic meetings with the groups.

Student Assignments: As described, students will report criteria to be used in the case study or studies. These criteria and their weights will also form a part of progress reports in the main project, and the final report must use those criteria to evaluate the group's solution.

Student Evaluation: The appropriateness and thoroughness of the criteria used will be explicitly evaluated in the grading of the case studies and progress reports, and the adherence to those criteria will be evaluated in the final report.

Objective 8: *Demonstrate the ability to make informed, sensitive aesthetic responses.*

Emphasis: None

Content:

Teaching Strategies:

Student Assignments:

Student Evaluation:

Objective 9: *Demonstrate the ability to function responsibly in one's natural, social and political environment.*

Emphasis: Significant.

Content: Introductory material will include formal instruction on group dynamics, conflict resolution, and balancing the interests of client groups. Case studies will include examples of ways that solutions to scientific or technical problems may affect the natural, social, and political environment positively or negatively.

Teaching Strategies: In addition to providing content about external responsibilities of technical and scientific workers, the case studies will require students to evaluate the external effects of their proposed solutions. Feedback on the case studies will guide students to improve such evaluations in the main project. The dynamics of group interaction itself may serve as a model of social and political responsibility. Fishbowl discussions may be used to demonstrate group dynamics and allow class discussion on issues raised.

Student Assignments: Students will include a discussion of external criteria for assessing their solutions in the main project during their progress reports, and will include environmental, social, and political impact assessments in the final report.

Student Evaluation: How well each member functions within the group will be graded both by instructor observation and peer evaluation. Explicit assessment of the environmental, social, and political impacts of proposed solutions will be part of the grading of the case studies and the final project report.

X. Background:

Instructors will have expertise appropriate to the particular project undertaken. The same committee mentioned in Section II above will review and approve the instructors for the proposed section.

XI. Class Size:

This will vary depending on the specific project undertaken, resources required, etc. As instructors will have to meet individually with student groups in most cases, and oral project reports are required, the class size should not exceed 20 in any case.