CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA
EXPANDED COURSE OUTLINE

Technology and Operations Management

2002-2003

Course Title: Senior Project Design & Development
Course Number: TOM 460
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SECTION A

I. Catalog Description:

TOM 460 Senior Project Design & Development (4)

Problem solving in a business environment. Problem identification and selection. How to prepare a senior project proposal, including problem statement, data collection procedures, selection of analysis techniques. Types of projects (laboratory, field, survey, ex post facto). Ethical issues. Presentation of summary proposals. 4 seminar. Prerequisites: TOM 301, TOM 302, TOM 315, TOM 332, TOM 401, and a minimum of three TOM Directed Electives.

II. Required Background or Experience:

A. **Prerequisites:** TOM 301, TOM 302, TOM 315, TOM 332, TOM 401, and a minimum of three TOM Directed Electives. The student must have knowledge of basic descriptive and inferential statistics, basic operations management models and techniques, TQM/continuous improvement, and at least three depth courses in technology and operations management.

B. **Prerequisites Justification:** To do problem solving, one must not only know what models and techniques are available to deal with the problem at hand, but also what data to collect and how to collect it, how to select the correct data analysis procedure given the model or technique used and the kind of data generated, how to conduct the appropriate analysis and draw conclusions, and how to make inferences based on those conclusions. TOM 301, TOM 302, TOM 315, TOM 332, and TOM 401 provide the necessary background in these areas. The TOM directed elective courses provide the depth required in at least one area of technology and operations management to serve as the foundation for conducting a senior project.

C. **General Education Contribution:** Students must have successfully completed STA 120 Statistics with Applications as a prerequisite to TOM 302 Managerial Statistics. In addition, students are expected to have the ability to express themselves both orally (COM 100 Public Speaking) and in writing (ENG 104 Freshman English I) in order to complete the required project proposal and its presentation.

III. Expected Outcomes:

Students will be able to:
a. evaluate and select appropriate designs and methodologies for a variety of problems;
b. conduct and prepare a review of related literature on a given topic;
c. select appropriate methods for analyzing qualitative and quantitative data;
d. develop and produce a project proposal on a topic of their choice; and
e. critically evaluate project designs, project methodology, and project results.

A senior project is to be a demonstration that the student can apply some aspect of what they have learned in the classroom to the "real world" of work. In TOM 460, a student prepares a proposal for a senior project which demonstrates their competence with acquired skills and knowledge. This is directly in line with the mission of a polytechnic university which has as a motto "Learn by doing."

IV. Text and References:

Textbook Decision: (By Instructor)

*Practical Research: Planning and Design, Seventh Edition, Leedy, Paul D., and Ormrod, Jane Ellis, Macmillan, 2001.

*Writing Empirical Research Reports, Third Edition, Pyrczak, Fred, and Bruce, Randall R., Pyrczak Publishing, Los Angeles, CA, 2000.

*Copies of TOM Department senior project proposals and completed senior projects from prior quarters.

*Current selection(s).

V. Special or Unique Student Materials:

___Zip Disk	_X_Calculator	___Camera	___Laptop
_X_____Floppy Disk	___Graph Paper	___Video Camera	_X_Computer
___CD-Rom	_X_Writing Pad	___Videotape	___Other

VI. Special or Unique University Facilities:

_X_Computer Lab	___Computer Connection	___"Smart" Classroom (one workstation)
___File Server	___White Board/Markers	___Overhead Screen
___Computer Projector	___VCR	___Microphone
___Laser Pointer	___Printer	___Moveable Classroom Furniture
_X_Internet Connection	___Laptop Ports	___Other

VII. Expanded Description of the Course and Instructional Methods:

A. Expanded Description of the Course:

TOM 460 Senior Project Design and Development is the course which initiates the senior project series of courses: TOM 461 Senior Project, TOM 462 Senior Project, and TOM 463 Senior Project Seminar.

Typically, the senior project task includes the ability to perceive a situation/problem, determine needed information, gather relevant data, analyze and interpret that data, and draw conclusions about the status of a particular situation and/or make recommendations for appropriate action towards improvement. To fulfill the Cal Poly Pomona commitment to "the practical application of knowledge," the conclusions should be valid and relevant, and the recommendations to management should be useful.

This course discusses the practical aspects of problem solving; development of ideas and questions; data sources, methods of measurement, and data collection; evaluation and selection of methodologies, techniques, and models; project design; qualitative and quantitative methods of analyzing data; selection of the appropriate analysis procedure depending on data collection strategies and kind of data collected; evaluation and critique of project proposals and reports; preparation and presentation of project proposals and reports.

Ethical issues in the conduct of a senior project are also presented, including prior notification of participants, informed consent of participants, permission to conduct a senior project in a given context, permission to collect data, permission to use data, fraud, fabrication of data, falsification of data, distortion or misrepresentation of results, and *non sequitur* conclusions.

Continuous Improvement (CI) and Total Quality Management (TQM) approaches to running an organization require the monitoring of processes and outcomes, and the feedback of information and results to the members of the organization. This course provides many of the basic tools needed to accomplish this task.

Every student in the Technology and Operations Management department must complete a senior project. This course provides a framework for the preparation of a proposal for a senior project.

B. Instructional Methods:

_X_Lecture	_X_Cases	_X_Individualized Instruction
_X_Lecture/Discussion	___Open Lab	___Cooperative Learning
___Seminar	___Videotapes	_X_Distance Learning
___Simulation	___Other	

VIII. Methods of Evaluating Outcomes:

Recommended Evaluation Tools:

Individual Paper _40%	Tests & Exams ___%	Individual Project ___%
Group Paper ___%	Quizzes ___%	Team Project ___%

Individual Presentation _10%	Peer Evaluation ___%	Outside/ExpertEvaluations___%
Group Presentation ___%	Other _40%	

Other: Weekly graded assignments producing project proposal components.

SECTION B

Week # Theme/Topic

1 Orientation/Introduction
- Course organization.
- Course requirements.

2 The Conduct of a Senior Project; Library Resources; Project Ideas
- The scientific method.
- Client selection.
- Topic selection, literature search, topic development, data collection and analysis, and outcomes.
- Faculty interviews.
- Ethical issues in the conduct of research. Research fraud.
- Discussion of course expectations.
- Discussion of client selection process.
- Discussion of topic selection process.
- Discussion of library resources.
- Discussion of the evaluation of 5 studies.
- Discussion of project ideas.
- Discussion of faculty interview process.

3 Project Ideas and Selection of TOM Models and Techniques; Planning the Project; The Problem Statement, Subproblems, Definitions, Assumptions, Limitations, Research Questions, and Hypotheses; Importance of the Study; Project Proposal Development
- Discussion of former senior project proposals from the course.
- Discussion of project ideas and useful TOM models and techniques.
- Problem definition and the project proposal.
- Exploratory research.
- Secondary data and information systems.
- The creation of a problem statement. Wording.
- The creation of subproblems.
- Definition of terms.
- Measurement of variables.

- Assumptions.
- Limitations.
- Research Questions. Hypotheses. Wording. Comparison of assumptions and hypotheses.
- Analysis of TOM models and techniques appropriate for the proposals being developed by the students in the course.
- Implementation procedures for models and techniques chosen.
- Analysis of problem statements, subproblems, definitions, measurement of variables, assumptions, and research questions and hypotheses for the proposals being developed by the students in the course.
- Analysis of barriers to successful completion of a senior project for the proposals being developed by the students in the course.

4 The Literature Review; Basic Research Designs and Methods; Planning the Senior Project; Client Interviews; Faculty Interviews; Data Collection; Ethical Issues in the Data Collection Process

- Purposes and structure of a literature review.
- Finding relevant material. Library and internet resources.
- Citations. Bibliography. Plagiarism.
- Discussion of the literature review.
- Basic research designs.
- Secondary data research.
- Data already in storage. Access to data. Permission.
- Informed consent.
- Survey research methods. Interviews, questionnaires, telephone, fax, email.
- Observational methods. Counting. Measuring.
- Experimental methods. Control.
- Discussion of planning a senior project.
- Discussion of faculty interviews: topic selection, design, data.
- Discussion of client interviews and client permission.
- Discussion of the data collection process. Relationship between research methodology, data collection procedures, measurement of variables, criteria for admissibility of data, analysis of collected data, interpretation of results.
- Discussion of ethical issues in the data collection process. Permission to access data. Permission to collect data. Informed consent for participation.

5 Writing the Project Proposal; Research Methods, Continued

- Characteristics of a proposal. Content and organization of a proposal.
- Timeline for completion of a senior project.
- Budget.
- Typical weaknesses and shortcomings. Why proposals are turned down. Effective proposals.
- Relationship between and integration of the problem statement, subproblems,

measurement of variables, data collection, data analysis, and interpretation of results.

- Discussion of preparation of first draft of proposal.
- Measurement and scaling concepts.
- Attitude measurement. Wording. Bias.
- Questionnaire design. Wording. Bias.

6 Research Methods, Continued; Submission of First Draft; Presentations by Current Senior Project Students

- Sampling techniques and procedures: convenience samples, simple random sampling, simple stratified sampling, proportional stratified sampling, cluster sampling, systematic sampling.
- Determination of sample size.
- Fieldwork.
- Submit first draft of senior project proposal.
- Presentations by current senior project students on their senior project experience.
- Discussion of student presentations.

7 Discussion of First Drafts; Research Designs; Data Collection Methods; Descriptive and Inferential Statistics

- Discussion of first drafts, in teams and individually.
- Designs: the timing of data collection. Pre-experimental designs. The experimental method. True experimental designs. Experimental and control groups. Ethical issues. Quasi-experimental designs. Correlational designs. Causal-Comparative and ex-post-facto designs. Archival data. Forecasting.
- Methods: the mechanisms for collecting data. Observation. Interviews. Questionnaires. Pilot-testing. Ethical issues. Electronic File Transfer. Secondary data. Delphi technique.
- Sampling: Definition of a population. Definition of a sample. Sampling procedures. Sample size. Sample size estimation. Bias.
- Operational definitions. Measurement of variables. Descriptive data.
- Measurement and scaling. Parametric versus nonparametric techniques.
- Reliability and validity.
- Editing and coding: transforming raw data into information.
- Descriptive statistics. Frequency counts and percentages. Tables. Histograms. The mean, variance, and standard deviation. Ratios. Rates. Graphs and charts.
- Inferential statistics. Interval estimation. Hypothesis testing. Univariate statistics. Z- and t-tests. Bivariate statistics. Regression and correlation. Chi square. Multivariate statistics. F-tests. Analysis of variance (ANOVA). Multiple regression and correlation. Discriminant analysis.

8 Analysis Procedures; Statistics and Research Designs; Faculty Interviews

- Discussion of faculty interviews: data collection and data analysis.
- Analytical methods. Answering research questions. Evaluating hypotheses.
- Appropriate statistical analysis procedures for archival data.
- Appropriate statistical analysis procedures for forecasting.
- Appropriate statistical analysis procedures for descriptive data.
- Appropriate statistical analysis procedures for experimental designs, correlational designs, and ex-post-facto designs.

9 Writing the Project Proposal; Carrying Out the Proposed Senior Project; Writing the Senior Project Report

- Creation of the final draft of the senior project proposal: style and format.
- What's next: carrying out the proposal. Registration. Senior Project Advisor selection. Proposal approval. Project completion. Deadlines. Rules and regulations.
- Style, format, and readability of the senior project report. Bibliography. Abstract. Executive summary.

10 Proposal Presentations; Submission of Final Draft of Senior Project Proposal; Course Review;

- Presentation of senior project proposals.
- Submit final draft of senior project proposal.
- Course review.

SECTION C

The next page of this expanded course outline present tables which record this undergraduate course's involvement in the issues listed in the tables. In the table, the percentage numbers, if any, identify which of the cited issues is a significant part of the course presentation. Information presented in other parts of this "Expanded Course Outline" clearly support the percentages assigned.

SECTION C: UNDERGRADUATE (AACSB CRITERIA)

General Education Goals*

Goal	% of course
Communication abilities	**25%**
Ethical understanding and reasoning abilities	**20%**
Analytic skills	**25%**
Multicultural understanding	**5%**

Reflective thinking skills	**25%**
Total:	**100%**

***sum should be ≤ 100%**

Management-Specific Learning Goals*

Goal	% of course
Ethical responsibilities in organizations and society	**20%**
Financial theories, analysis, reporting, and markets	
Creation of value through the integrated production and distribution of goods and services	
Group and individual dynamics in organizations	
Domestic and global economic environments of organizations	
Other management-specific knowledge and abilities	**80%**
Total:	**100%**

***sum should be ≤ 100%**

***Explanation of percentages: these percentages are being collected as part of an AACSB requirement.**