External Reviewer’s Report

Presented to:
College of Engineering
Industrial & Systems Engineering Department
San Jose State University

Prepared for:
Robert Cooper Ph.D., Associate Vice President
Pamela Stacks, Ph.D., Associate Vice President
Dan Perales, Ph.D., Program Planning Committee
Belle Wei Ph.D., Dean, College of Engineering
Ahmed Hambaba, Ph.D., Associate Dean
Louis Freund, Ph.D, Chair, Industrial & Systems Engineering

Prepared By:
Kamran Abedini, Ph.D., Professor
California State Polytechnic University, Pomona

March 2007
**External Reviewer’s Report, Industrial and Systems Engineering**

**Background:**

The review and evaluation presented in this report was performed based on invitation from the College of Engineering at San Jose State University. An information booklet was provided about the university, College of Engineering, and specifically the Industrial and Systems Engineering (ISE), in addition to Program Planning Guidelines and Curricular Priorities.

The site review was conducted on February 8th and 9th, 2007. This reviewer had the opportunity to meet with the Program Planning Committee representatives including the Associate Vice Presidents, Dean of College of Engineering and her Associate Deans where their concerns and objectives were noted. There were subsequent meetings with the Chair of ISE department and the faculty members, both full time and part time, the staff, and also groups of students sampled from undergraduate and graduate programs.

An Exit interview was scheduled on the last day of the visit at which university representatives were gathered and the essence of the following report was presented to them.

**The Review Outline:**

The outline of the report was designed to address the objectives described in the “San Jose State University, Program Planning Guidelines” dated November 27, 2006, where the external reviewer’s role and report was specifically mentioned. The reviewer was able to refine the outline by specifically categorizing the evaluation based on the university’s “Curricula Priorities” where criteria for the evaluation of the curriculum was presented:

A. Centrality to Mission  
B. Quality of Instructional program  
C. Student Demand  
D. Societal need  
E. Financial Resource effectiveness, viability and efficiency  
F. Interdependence of programs  
G. Capacity to contribute to an academic field  
H. Availability of instructional alternatives

Addressing the above would enable this reviewer to provide responses to the questions presented in the first paragraph of Appendix 5: External Reviewer, mentioned in the Program Planning Guidelines.
Reviewer’s Perspectives:

Each of the criteria for the evaluation of the curriculum was evaluated from the following points of view:

A. The Reviewer is an alumnus (graduate of 29 years ago) of San Jose State University and the ISE department, as such the old curricular was compared with the present. The graduate work was done at USC, where the graduate programs offered are similar to that of SJSU.
B. The Reviewer is currently a professor Industrial Engineering at a CSU campus and as such familiar with CSU expectations, environment, constraints and capabilities.
C. The Reviewer has more than 25 years of industry consulting experience and as such capable of reviewing from the expectations of customers of such programs.
D. As a former Regional Vice President of the Institute of Industrial Engineers (IIE), the expectations of the profession is also considered.
E. The review experience of evaluating other programs for the Chancellor’s office makes it possible to conduct this review more professionally.

Review & Evaluations:

As described in the aforementioned sections this review will be based on the criteria for the curriculum evaluation which was formed to satisfy most concerns of those interviewed at the site visit.

A. Centrality to Mission

The ISE department has been providing in depth knowledge in Industrial and Systems Engineering for many years, and has been accredited by Accreditation Board for Engineering and Technology (ABET). It is probably one of unique engineering programs at which students are educated in variety of fields of engineering, in addition to business. Communication is of utmost importance since graduates will have to integrate different systems and explain the result to both engineers and managers. ISE graduates typically will end at management where specially with the supply chain concerns, they have to be educated in multi-cultural and global perspectives. As such the mission of the department perfectly matches that of the College and the University.
B. Quality of Instructional Program

The ISE department is responsible for several degree programs including a B.S. in ISE, M.S. in ISE, and M.S. in Human Factors/Ergonomics.

The undergraduate program has changed dramatically from years ago. The focus is to provide graduates who can apply their knowledge in the immediate surrounding of Silicon Valley. As such less courses are offered in hard core manufacturing, and more on teaching tools used for systems analysis or service industries. Although this satisfies many of the employers, this reviewer believes that additional perspectives could be presented to the students, if not through a course but through scheduled plant tours, so that graduates feel more comfortable entering a production facility. The department already has two courses in Supply Chain Management which is a current subject expected to be learned by IE graduates.

ISE’s ranking is high amongst public universities providing up to Master’s level, and the department has developed a survey to assess the graduate’s success through the eyes of employers.

The undergraduate students interviewed thought highly of their professors and specially liked the “Family” atmosphere the department had provided. They were encouraged and supported to attend regional IIE Conferences and Technical Paper Competitions.

Student advising was regarded to be important. The staff presented an electronic form that was developed for the ISE students to keep track of their progress and use it at advising. This was a great tool which could eventually be used by all other San Jose State University departments.

The department has developed assessment tools used primarily at the Senior year. Based on this reviewer’s experience, another assessment tool could be developed to assure adequate measurement of progress while at the ISE department to be administrated at the start of the Junior year.

The Master of Science in Human Factors/Ergonomics is a well planned, Managed, and staffed program at ISE. It is the only program of its kind in California and as such is highly demanded. The HAIL Laboratory, directed by Dr. Corker is supported by external research funds and is active in both applied and basic research. The capacity is the ultimate factor affecting the growth of this program.

The MS in ISE program contains the basic requirement of such programs. It is also faced with the same challenge that other such programs have, which is the difficulty of teaching a course to those who could either have
a background and a BS in IE, or those who do not. Thus a graduate level class could satisfy many or be just a “review” as mentioned by a former ISE student currently in the graduate school. A solution to this problem is highly desirable. It was also observed that pre-requisites for this degree is only offered in Fall semesters. This could hinder one who might want to start in Spring.

The ISE faculty members are also involved in teaching students enrolled in MS in Engineering Management. The program is planned and controlled by the College of Engineering. Almost all such programs this reviewer is familiar with, whether at a CSU or private university (USC) are housed in the ISE department. The main reason is the familiarity of those in this field with requirements of Engineering Managers. For comparison purposes, at Cal Poly Pomona, Engineering Management is a joint program between College of Engineering and College of Business, but directed and managed by the Industrial Engineering Department and its faculty members. Effective student advising and evaluations seem to be difficult if not done by those who have expertise in the field. Thus it is recommended to assign the required responsibility and resources so that ISE could become the organization directing the MS in Engineering Management.

C. Student Demand

Great majority of the students in ISE are transfer students. This has caused less attention to high school students who might be interested in this field once informed. A phenomena that is being experienced by many countries including China is that their ISE students number more than other Engineering majors combined! As expressed by many industry executives, engineers nowadays are expected to be multi-tasking and less specialized. This is an advantage of an IE graduate. Not only the ISE department at San Jose State University, but the whole CSU systems should become more aware of this change and help in promoting IE to high school and Jr. College students. The demand for students graduating is high but supply is still less than expected, mostly because of lack of publicity.

D. Societal Need

As previously mentioned, ISE grads are specifically trained for the immediate environment’s needs, Silicon Valley). Thus their knowledge and skills are immediately used by such employers. One aspect that was previously not addressed adequately, “Ethics” has now been programmed in the curriculum of all Engineering programs. It is recommended that the issue of “Ethics” be part of all courses and be a
part of assessment such that a student can understand in any decision making process, ethical issues should also be considered.

E. **Financial Resources effectiveness, viability and efficiency**

A unique problem that Engineering departments are faced with is that they need laboratories for teaching and research, but unlike Science departments, the footprint through such labs are low (Since only specific specialties take such labs, not like Physics that all Science & Engineering students had to take them). This makes these labs that are vital to programs, also costly. ISE has an advantage that their Human Engineering lab is supported through external research. The production lab is organized well, but may need constant maintenance by a technician. There are five full time faculty members in ISE. In average they are involved with research, university service or managing the program 30 per cent of the time. This indicates that only 3.5 full time equivalent faculty members are teaching and advising. For this size of the department additional faculty members are needed for teaching and advising.

F. **Interdependence of Programs**

ISE department provides service courses and three Master’s level programs for the College of Engineering. The graduate programs in ISE consist of combination of courses in variety of departments.

G. **Capacity to contribute to an academic field**

All full time professors at ISE are involved in research and publications. This is an outstanding accomplishment for a CSU Campus which the emphasis is also on teaching.

The Chair of ISE has been an active member and officer of the Institute of Industrial Engineers and is currently a Vice President at this national organization. His special interest in Health Systems greatly contributes to design of systems used for health care delivery.

H. **Availability of Instructional Alternatives**

The MS in Human Engineering is the only one of its kind and if the capacity is expanded, it could grow substantially.

There are three other universities in Northern California offering ISE type programs. CSU East Bay is new and does not have the resources to compete. UC Berkley and Stanford are both more concentrated on graduate work or Operations Research and neither necessarily provides practical engineering training for their undergraduate programs.
Final Notes:

It was great honor to be selected as the External Reviewer for San Jose State University. The reviewer would be pleased to be contacted for further consultation regarding the evaluation if needed.

Respectfully Submitted,

Kamran Abedini, Ph.D.
(909) 869-2569
kabedini@csupomona.edu