Five Year Review Report for M.S. in Engineering Management

Department of Engineering

1. Summary of the Program

The objective of the M.S. in Engineering Management is to train professionals for leadership roles in engineering, manufacturing and service industries. This program will enable individuals with a degree in engineering, science or related fields who are working in manufacturing and service industries to advance their careers into management positions. The San Francisco Bay Area is a prime location for offering this degree because of the concentration of a large number of high tech engineering, manufacturing and service industries.

Students take 48 credit hours for graduation including a 4 credit hours capstone project course. The prerequisites for the degree program are a course in statistics, a course in engineering economy and a course in basic accounting or equivalent academic experience. The core includes seven industrial engineering courses, including a course in project management and a project. Also, there are two management courses in the core. There are three elective courses where students can select from business, engineering, statistics or other areas to specialize in their areas of interest.

M.S. in Engineering Management started in Fall 2005 with 10 students in the first class. The program has grown substantially since then. It currently enrolls around 90 students in the program. As the number of applications to the program has grown we have been able to tighten the admission requirements thus admitting more qualified students. The majority of the students in the program are working professionals who wish to advance their careers to management positions in technical enterprises.

2. Self Study

2.1 Summary of Previous Review and Plan
N/A

2.2 Curriculum and Student Learning

The program includes 12 units of prerequisite courses, 36 units of required courses including a Project and 12 units of electives. Students have the option to take a four-unit Project course as part of required courses or to take an additional four-unit elective course and pass a comprehensive examination (upon completion of all required courses).

Required Courses

ENGR 4180/5180 Product Process Design (4)

ENGR 4200/5200 Systems Simulation (4)

ENGR 4280/5280 Design and Management of Human Work Systems (4)

ENGR 6200 Project Management (4)

ENGR 6300 Applied Quality Assurance (4)

ENGR 6400 Research Methods in Engineering Management (4)

ENGR 6899 Project (4)

Finance 6215 Graduate Introduction to Financial Decisions (4)

MGMT 6130 Enterprise Planning and Control (4)

Electives

Number of elective units is 12 (16 elective units are needed if student elects to take the comprehensive examination instead of the Project).

Students with the departmental approval can select courses in Engineering, Business, Computer Science or Statistics as electives. No more than 4 units of independent study ENGR 6900 can be used as electives. A partial list of electives is given here,

CIS 6070 Graduate Introduction to Information Systems

ENGR 6900 Graduate Independent Study

MGMT 6150 Global Supply Chain Management

MGMT 6470 Management of Technology and Innovation

MGMT 6560 High Performance Management

or other graduate courses in Engineering, Computer Science, Business and Statistics with the departmental approval.

As it is apparent from the list of courses, three required courses are tiered courses with our undergraduate Engineering program (accredited) and two other required courses are Business courses (accredited program). There are three strictly graduate engineering courses ENGR 6200, 6300, and ENGR 6400 that are required. These courses are taught by Drs. Ganjeizadeh, Zong, and Motavalli, which are all also teaching in the accredited undergraduate program. The same assessment and evaluation methods used in the undergraduate program are also used in our graduate program. In addition we are administering a survey to graduating Engineering Management students for more feedback about the courses and the program in general. The analysis of the data acquired from this survey is given in appendix A.

Program Objectives

The objectives of the M.S. in Engineering Management are: 1) to prepare future managers of technical enterprises; 2) to enable current and future engineers/scientists to assume leadership positions as they advance in their careers; and 3) to meet the demand for effective engineering managers who are able to lead technically complex industries.

This degree is different from other Engineering Management degrees in that it includes a well-balanced curriculum consisting of quantitative courses in industrial engineering and qualitative management courses. The curriculum gives students an understanding of both the engineering and management perspectives. This is valuable for individuals managing engineering/high tech firms.

Students take required courses in design and management of human work systems, systems simulation, applied quality assurance, product-process design, project management, and research methods in engineering management. Also included in the core are courses in financial management and enterprise planning and control. Students also have a broad choice of electives, allowing them to select from many areas of specialization.

2.3 Students, Advising , and Retention

There are three categories of student status, which reflect student progress toward the degree: "Conditionally Classified Graduate" student, "Classified Graduate" student, and "Advancement to Candidacy" student.

1. Students achieve "Conditionally Classified Graduate" status when they have been admitted to the M.S. in Engineering Management degree program, but have not yet completed the prerequisites for the "Classified Graduate" status in the M.S. in Engineering Management degree program.
2. Students achieve "Classified Graduate" status when they have satisfactorily completed the three prerequisites for the M.S. in Engineering Management degree program or their equivalents, and satisfied the University Writing Skills requirement. (See "Prerequisites for Classified Graduate Status.")
3. Students are advanced to Candidacy when they have completed the required courses with a 3.0 or better GPA.

Note: Students who fail to maintain progress by falling below a 3.0 GPA in their graduate courses for two or more consecutive quarters will be academically disqualified from the university.

Prerequisites for "Classified Graduate" Status

As prerequisites to "Classified Graduate" status, students must satisfy the University Writing Skills Requirement and satisfactorily (with a grade of C or better) complete three courses:

ACCT 2253 Accounting for Management Decision Making

ENGR 3140 Engineering Economy

ENGR 3601/5601 Introductory Statistics and Probability for Science and Eng.

Students can request to have one or more of these prerequisites waived based upon coursework taken at other schools. These prerequisite courses should be taken before attempting the core graduate courses.

Student Advising

Each student in the Department of Engineering has an assigned faculty member as his/her academic advisor. Upon entering the program, each student is assigned this advisor considering department faculty members' advising load. This assignment continues throughout the student's program, thus providing continuity in the relationship between the student and advisor. The students are free to change their advisors by simply notifying the Departmental secretary so that records can be updated to indicate the new assignment. Before each quarter's pre-registration period, each student is reminded, by e-mail, of advising schedules. Every new faculty is mentored by the department chair on advising procedures. Also, at the beginning of each academic year, the advising process is reviewed at a faculty meeting.

The department keeps student records that include:

- Graduation check sheet
- Student's transcript for courses taken at other institutions
- Record of all transfer courses accepted
- Comments by the faculty advisor/chair where needed for exceptions.

At registration (or pre-registration) each quarter, the student meets with his/her advisor. During this consultation, the student and the advisor have the student's file, the advising sheet, the program requirements, prerequisite structure and the CMS system available.

2.4 Faculty

Our graduate and undergraduate programs are taught by the same faculty. We also have faculty from College of Business that are teaching business courses taken by our students. From time to time, they also serve as MS project advisor for our students. The following is the list of the faculty in Engineering Management program.

David Bowen, Ph.D. Associate Professor, Engineering

David Bowen earned his B.S., M.S., and Ph.D. degrees in Industrial Engineering and Operations Research from UC Berkeley, where he also served on the faculty as a lecturer and research engineer and conducted research as part of the Competitive Semiconductor Manufacturing Program. In addition he has taught Graduate business courses at the University of San Francisco and St. Mary's College of Moraga.

Prior to starting his own consulting firm (BOPTIMAL), David was the corporate-wide Education and Training Manager for TEFEN Ltd., a worldwide Industrial Engineering consulting firm. His previous consulting experience includes projects for State and Federal government agencies as well as private industry. His international experience includes consulting in Asia, conducting research in Asia and Europe, and teaching in Africa as a US Peace Corps Volunteer. Dr. Bowen is an experienced educator, researcher, manager and consultant in the following areas: Creating, Training and Facilitating Improvement Teams, Capacity Modeling, Cycle-Time Reduction, Overall Equipment Effectiveness, Human Factors Engineering, Engineering Economy and Process Reengineering.

Farnaz Ganjeizadeh , Ph.D. Associate professor, Engineering

Farnaz Ganjeizadeh completed her Ph.D. in Industrial and Systems Engineering from the University of Alabama in Huntsville. She earned her M.S. in Engineering Administration and B.S. in Industrial Engineering and Operations Research from Syracuse University. Her research interests are in the areas of the application of simulation output analysis and manufacturing processes improvement.

Prior to joining CSU east Bay, Dr. Ganjeizadeh served as a part time faculty at San Jose State University, where she designed and taught a graduate course in Engineering Analysis. Additionally, she has taught several courses in Industrial Engineering and was a major contributor to several government funded research projects with NASA/MSFC, GenCorp Aerojet, Chrysler and NSF at the University of Alabama in Huntsville. Dr. Ganjeizadeh has an extensive background in the Semiconductor Manufacturing Equipment Industry. She served as a member of the technical staff and a manufacturing engineering manager at Applied Materials. Her experience includes designing an inductive model deployed for conducting multi-criteria decision-making and cost analysis at the system level. Additionally, Dr. Ganjeizadeh's specialties are in the areas of strategic planning, new product introduction, simulation output analysis and applied operations research, quality assurance and product cost management.

Saeid Motavalli, Ph.D. P.E., Professor and Chair, Engineering

Dr. Saeid Motavalli has extensive industrial and academic experience. Before joining CSUH, he served as a senior engineer at Biomechanics Corporation of America, an Assistant Professor at Wichita State University, and an Associate Professor at Northern Illinois University. Dr. Motavalli's area of research is manufacturing systems. In particular, he is interested in problems related to process flow analysis, facilities planning, workplace design/ergonomics, and manufacturing measurement. He has worked on federally funded research by various federal agencies such as NSF and FAA.

Zinovy Radovilsky, Ph.D., Professor of Management

Dr. Zinovy Radovilsky is a Professor of Management in the Department of Management CSU East Bay. He has master's degrees both in Industrial Engineering and Computer Science, and a Ph.D. in Economics with a concentration in Operations Research and Operations Management. Dr. Radovilsky joined CSU East Bay in 1991. At CSU East Bay, he has taught graduate and undergraduate courses in production and operations management, quantitative business methods, enterprise resource management (ERM) and enterprise resource planning (ERP), e-commerce, supply chain management, decision analysis and modeling, quality management, forecasting, and econometrics. He has also taught courses in quantitative business methods, enterprise planning and control, and e-commerce for the CSU East Bay International MBA Programs in Beijing, Hong Kong, Singapore, Beijing, and the Transnational Executive MBA Program (TEMBA).

During his tenure at CSUEast Bay , Dr. Radovilsky developed and introduced (in collaboration with other faculty) two new options of the CSU East Bay MBA program: Operations and Materials Management, and Supply Chain Management. He modified the CBE undergraduate BSBA options in Production and Operations Management, and Purchasing and Materials Management. He has also developed, introduced and taught a variety of new courses for the

undergraduate and graduate programs, including Enterprise Resource Management and E-commerce, Enterprise Resource Planning and Control, Quality Management, and others.

Helen Y. Zong, Ph.D. P.E., Professor, Engineering

Dr. Zong has many years of experience in higher education and manufacturing industries. Before joining CSUEast Bay, Dr. Zong served as an Associate Professor at St. Cloud State University, an Assistant Professor at Jianghan Petroleum Institute and a mechanical engineer in China. During her professional career, Dr. Zong has worked on many research and consulting projects with industries, such as UPS, Fingerhut, Caterpillar, KOMO Machines, Blow Molded Specialist, etc. Dr. Zong's professional specialties include manufacturing processes and improvements, manufacturing system simulations, facilities planning and designs, material handling system design, quality assurance and design of experiments, production planning and control systems, production sequence and scheduling, expert system development, computer-integrated manufacturing, and operations research. Dr. Zong's teaching interests are in the areas of manufacturing system simulations, production planning and control, facilities planning and designs, quality assurance and engineering economy.

2.5 Resources

This section of the report describes classrooms, laboratory facilities, equipment, and infrastructure and discusses the adequacy of these facilities to accomplish program objectives, as required by Criterion 7.

Classrooms

Most Engineering courses are held in classrooms located in the Science and the new Business and Technology (VBT) Buildings. The majority of classrooms holds up to 35 students and are adequate for teaching the courses. Larger size classes and multi-media rooms are also available in the Science and VBT buildings. Almost all classrooms are equipped with computer stations and overhead projection systems (multi-media capable). In uncommon situations where the class is not equipped, the instructor can request portable systems. The University Computer Services Center provides LCD projectors, Laptop computers, VCRs and TVs on demand. Also the Engineering Department owns LCD projectors and screens for Lab. use.

Laboratories

With our move to the new facility in the VBT building, we have ample space for laboratory facilities. We have three relatively large laboratories in the VBT building and one large laboratory in the Science building. Also with our move to the new building we received in excess of $200,000 in new equipment money. Using these funds we developed a state-of-the-art computer laboratory with 35 stations. We also purchased several new pieces of equipment for our Performance Measurement Laboratory. Currently the Department maintains four Laboratories to support the undergraduate and graduate courses in the Engineering program. These labs contain a variety of traditional as well as advanced manufacturing, measurement, ergonomics and computational equipment. These laboratories include:

Computer Integrated Manufacturing/Quality Testing (Room VBT 231): Serves as a teaching lab for Fundamentals of Manufacturing (ENGR 2070), Quality Engineering (ENGR 4300) and

Computer Integrated Manufacturing Systems (ENGR 4440). It is designed and developed to support various engineering courses with equipment ranging from table-top machine tools, robots, coordinate measuring machine and computer workstations to control this equipment.

Computer Laboratory (Room VBT 223): Our new computer laboratory houses 35 computer workstations equipped with the latest versions of IE and manufacturing software. We also have several laptops that can be borrowed by faculty and students to work on-special projects. This laboratory is open to engineering students to work on their projects and homework. This lab is utilized as a teaching lab for courses such as Engineering an Introduction (ENGR 1011), Engineering Graphics (ENGR 1420), Electric Circuits (ENGR 2010), Simulation (ENGR 4200), Reliability Engineering (ENGR 4350), Systems Engineering (4400), Facilities Planning (ENGR 4430) and CIM Systems (ENGR 4440). This lab is equipped with multi-media presentation equipment.

Human Performance Laboratory (Room VBT 230): The Human Performance Laboratory is the newest laboratory in Engineering. Engineering courses such as Work Design and Measurement (ENGR 3020), Human Factors (ENGR 3190) and Design and Management of Human Work Systems (ENGR 4280) utilize this lab. The lab is equipped with various types of work measurement hardware and software, a treadmill and a work simulator machine. It also houses two Segway vehicles to study ergonomic design concepts. This laboratory is equipped with multi-media presentation equipment.

Material Testing Laboratory (Room South Science 247): Material Testing Laboratory houses an MTS machine, a torsion tester, an engineering microscope, and other measurement equipment. The lab houses a plastics processing equipment that is capable of demonstrating various plastics processes such as injection molding, blow molding and extrusion. This laboratory is utilized in Engineering Materials (ENGR 2060), Fundamentals of Manufacturing (ENGR 2070) and Quality Engineering (ENGR 4300).

Open Computer Laboratories: College of Science operates several computer labs, which are open to all College of Science students. These laboratories can also be used as classrooms. The computers are loaded with various software including optimization software tools.

3.0 Five Year plan

3.1 Curriculum

As part of our continuous improvement plan we are monitoring our assessment data and evaluate changes in the market place to make program modifications. The changes over the past 5 years are as follows:

FIN 6033 was replaced by FIN 6215, This change was required because CBE changed their curriculum. We have started offering ENGR 6899 Special Topics in Engineering, where we introduce contemporary issues in Engineering Management. Many of our senior level undergraduates have been tiered so our graduate students can take these as electives. CBE is now much more restricted in letting Engineering students into their classes.

We anticipate offering more electives in the future to provide more choice to our graduate students.

3.1 Students

The growth in the number of students has exceeded our expectations. We are currently enrolling about 90 students in the program. We expect the number of applications to increase in the future. We have become more selective in our admission standards. We expect that in the near future we will need to offer some of our graduate courses more than once a year. Therefore there will be need for more lecturers to cover these courses.

3.2 Faculty

As mentioned before, current engineering faculty teach both graduate and undergraduate courses. We anticipate that in the next five years we need to hire one full time TT faculty in the area of industrial engineering/engineering management to cover additional courses and sections required by the growth of this program..

3.3 Other Resources

We have continuously upgraded our laboratory equipment and software. We anticipate that resources will be available to upkeep our laboratories during the next five years.

4.0 Outside Reviewer Report

Submitted with our undergraduate program

5.0 Program Response to Outside Reviewer Report

N/A

Appendix A Assessment Data

GRADUATE STUDENT SURVEY

Note to Graduate Students: Engineering Department continually measure and assess it's degree programs. Through this survey, the Engineering Department is attempting to collect information for such assessment. We will give the highest level of attention to students' comments. To ensure confidentiality, please do not to write your name or ID number anywhere on this survey form. Please complete all pages of the survey. Thank you for your cooperation and assistance.

Major: Industrial Engineering

I. Evaluation of Engineering Courses Taken at CSUEB

For each course that students have taken at CSUEB, they rated theirs value (as they perceived) toward their:

- Professional Development
- Career/Job Prospect Enhancement
- Development as a Person

REQUIRED COURSES	Course not taken	No Value	Low Value	Some Value	High Value	Very High Value
ENGR 5180/4180				1	4	2
ENGR 5200/4200	1			3	2	1
ENGR 5280/4280					5	2
ENGR 6200				1	2	4
ENGR 6300					2	5
ENGR 6400	1			2	1	3
FIN 6033	5			1	1	0
CSUEB COURSES						
MGMT 6130				1	6	
ENGR 6899	7				0	
ELECTIVE COURSES						
FIN 6360				1	0	0
MGMT 6100					2	1
MGMT 6060					1	0
MGMT 6150	1				0	0
CIS 6160					1	0
MGMT 6470					1	1
CIS 6275					1	1
CIS 6100					1	0
MGMT 6570					3	0
MGMT 6560	1				0	0

Table 1Evaluation of Engineering Courses at CSUEB

Descriptive Statistics: High Value

Variable	Total Count	Mean	Median	Maximum
High Value	7	2.429	2.000	5.000

Table 2 Statistics Description of High Value Courses

Descriptive Statistics: Very High Value

Variable	Total Count	Mean	Median	Maximum
Very High Value	7	2.429	2.000	5.000

Table 3 Statistics Description of Very High Courses

Percentages of Respondents indicating “High” or “Very High” value for **Engineering Required Courses**

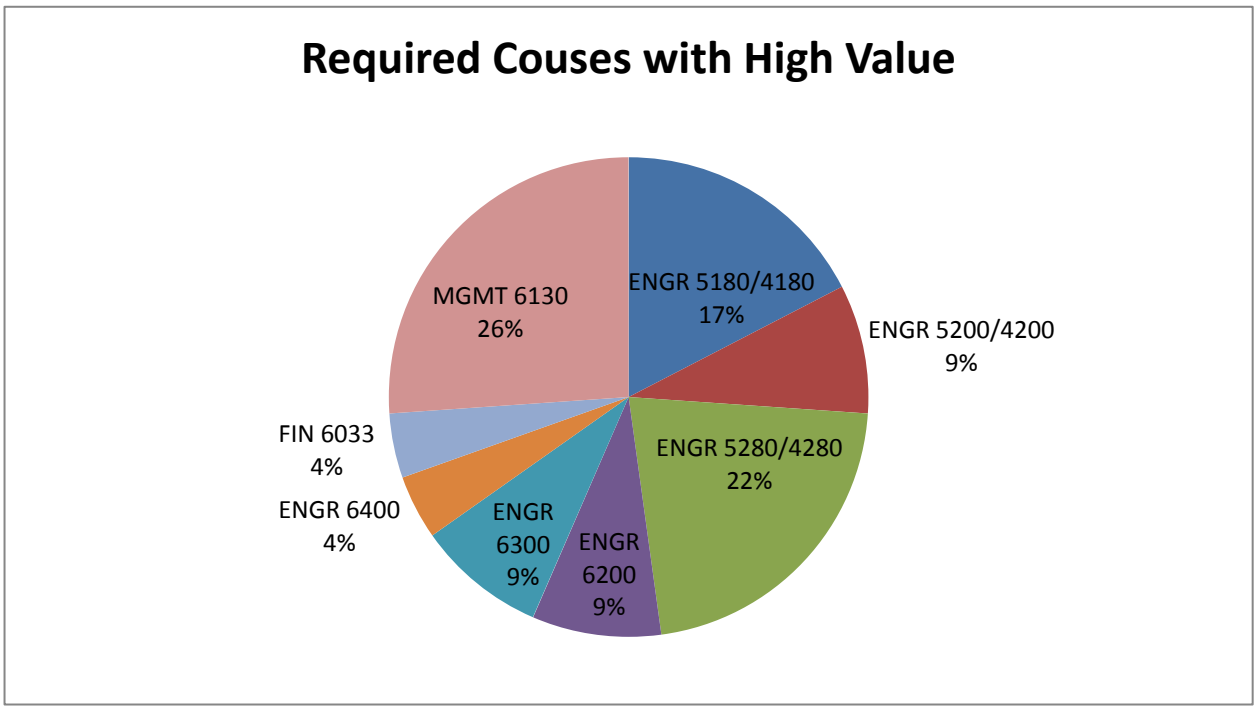


Figure 1 Percentages Engineering Courses with High Value

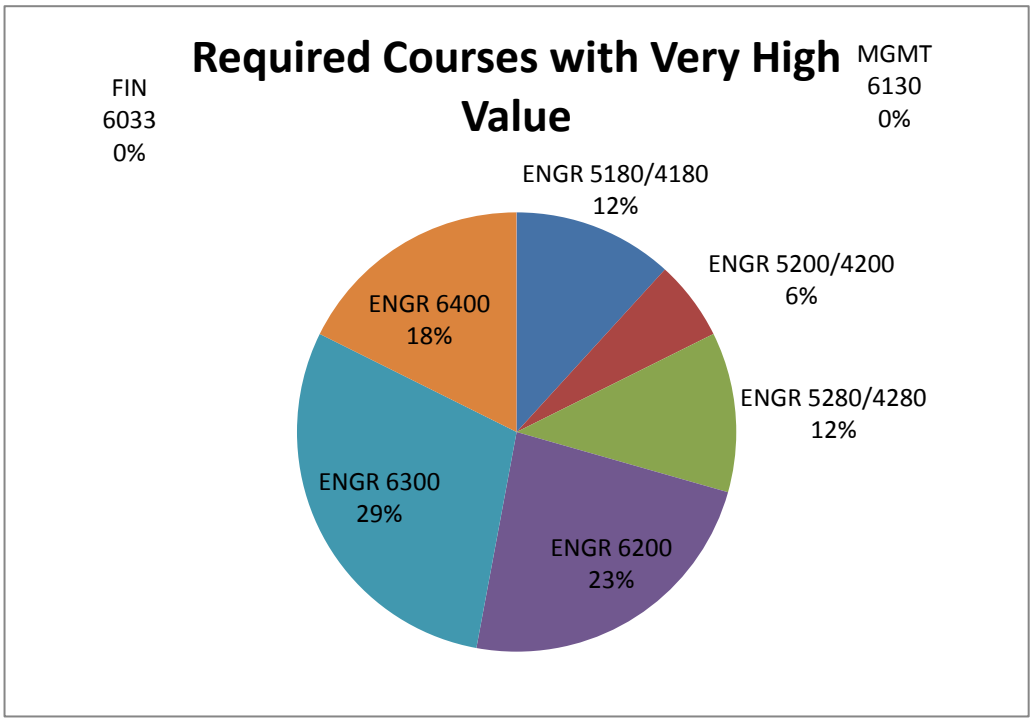


Figure 2 Percentages of CSUEB courses with Very High value

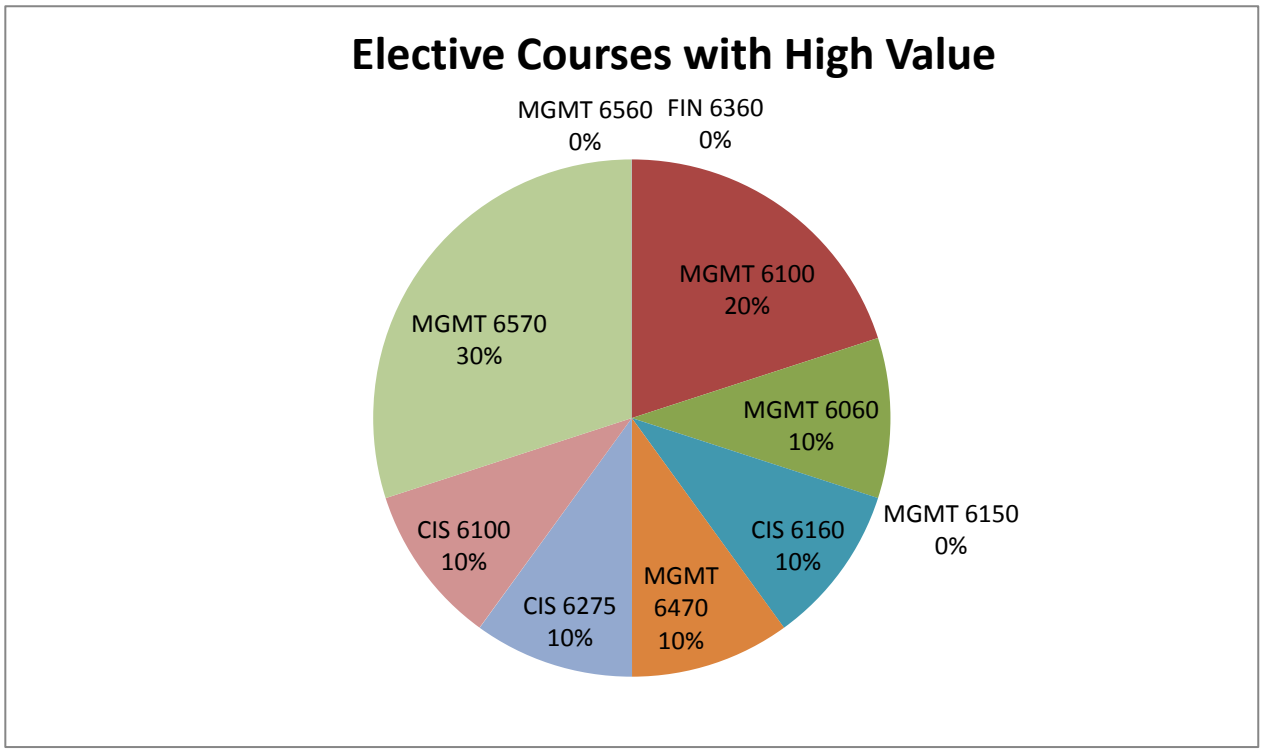


Figure 3 Percentages of Elective Courses with High Value

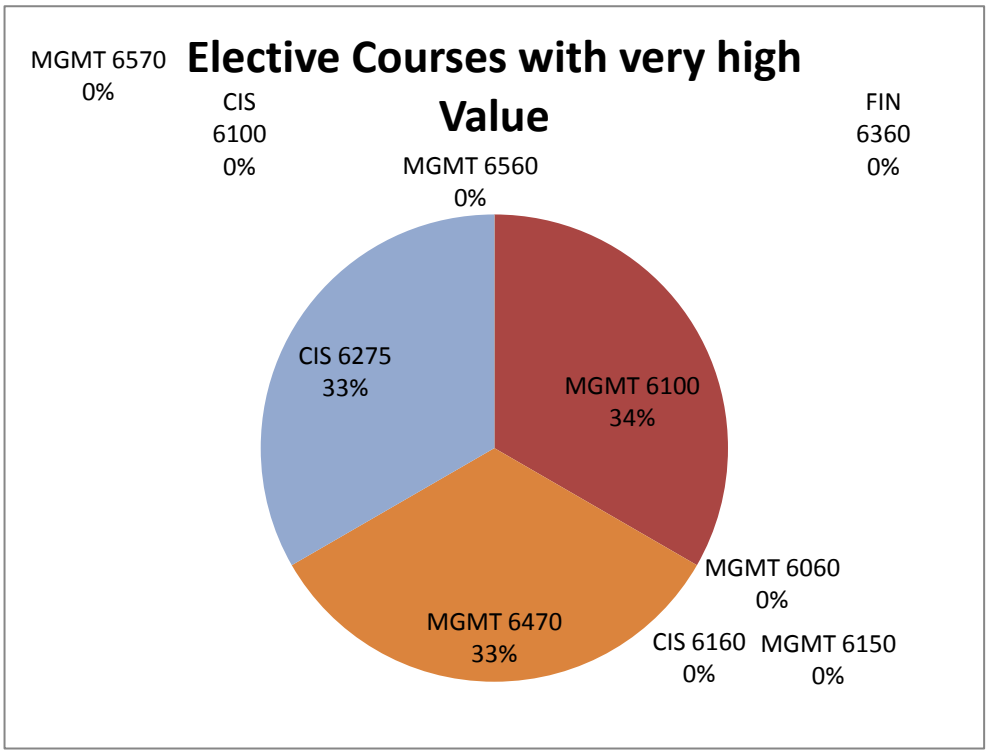


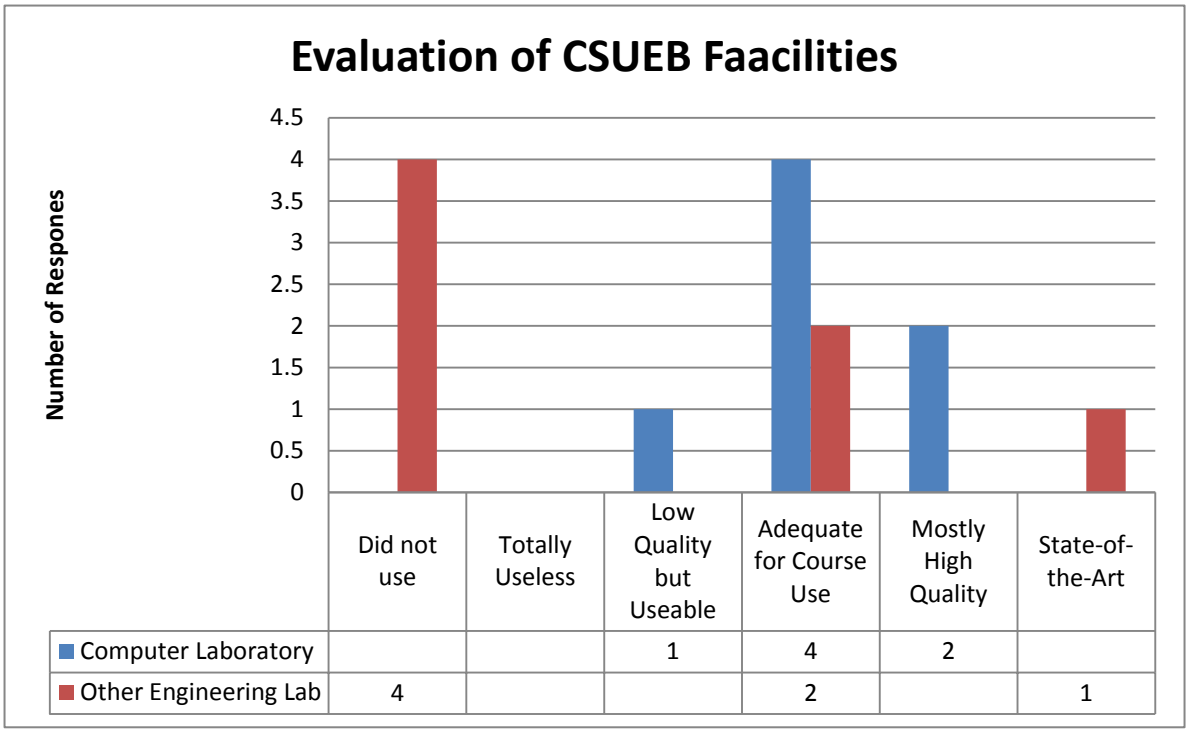
Figure 4 Percentages of Elective Courses with very High Value

II. Evaluation of ENGR Facilities

The students evaluate the quality and facilities of engineering laboratories.

CSUEB Laboratory		Quality of Equipment and Facilities					Comments
	Did not use	Totally Useless	Low Quality but Useable	Adequate for Course Use	Mostly High Quality	State-of-the-Art	
Computer Laboratory			1	4	2		
Other Engineering Lab	4			2		1	

Table 4 Evaluation of Engineering Facilities and labs



Appendix B: Program statistics

California State University, East Bay

APR Summary Data

Fall 2005 - 2009

Engineering					
	Fall Quarter				
	2005	**2006**	**2007**	**2008**	**2009**
A. Students					
1. Undergraduate	97	96	106	131	152
2. Graduate	4	16	25	46	89
3. Total Number of Majors	101	112	131	177	241
4. FTES Generated	25.9	34.3	31.9	46.2	80.9
	College Years				
B. Degrees Awarded	**04-05**	**05-06**	**06-07**	**07-08**	**08-09**
1. Undergraduate	12	8	13	11	13
2. Graduate	0	0	0	1	5
3. Total	12	8	13	12	18
	Fall Quarter				
	2005	**2006**	**2007**	**2008**	**2009**
C. Faculty					
Tenured/Track Headcount					
1. Full-Time	4	4	4	4	4
2. Part-Time	0	0	0	0	0
3. Total Tenure Track	4	4	4	4	4
Lecturer Headcount					
4. Full-Time	0	0	0	0	0
5. Part-Time	0	0	0	0	0
6. Total Non-Tenure Track	0	0	0	0	0
7. Grand Total All Faculty	4	4	4	4	4
Instructional FTE Faculty					
8. Tenured/Track	3.5	3.7	3.3	2.6	2.3
9.Lecturer	0.1	0.1	0.0	0.2	1.2
10. Total Instructional FTEF	3.6	3.8	3.3	2.8	3.6
Lecturer Teaching					
11. % Lecturer/Total Instructional FTEF	3.9%	3.1%	0.0%	7.9%	34.6%
12. FTES Taught by Lecturer	2.7	3.5	0.0	6.1	24.3
13. % FTES Lecture/FTES Generated	10.3%	10.1%	0.0%	13.3%	30.0%
D. Student Faculty Ratios					
1. Tenured/Track	6.7	8.3	9.7	15.7	24.3
2. Lecturer	18.7	29.1	0.0	28.4	19.8
3. SFR By Level (All Faculty)	7.2	8.9	9.7	16.7	22.7

4. Lower Division	2.9	6.8	7.7	7.1	17.5
5. Upper Division	10.3	11.3	11.6	16.0	29.3
6. Graduate	6.4	6.2	8.0	19.5	19.1
7. Number of Sections Offered	10	11	16	17	16
8. Average Section Size	12	13	10	11	23

Source and definitions available at: http://www.csueastbay.edu/ira/apr/summary/definitions.pdf

	Fall Quarter				
Headcount Enrollment	**2005**	**2006**	**2007**	**2008**	**2009**
Engineering					
1. Undergraduate	97	96	106	131	152
2. Graduate	4	0	2	1	4
3. Total Number of Majors	101	96	108	132	156
Engineering Management					
1. Undergraduate	0	0	0	0	0
2. Graduate	0	16	23	45	66
3. Total Number of Majors	0	16	23	45	66
Construction Management					
1. Undergraduate	0	0	0	0	0
2. Graduate	0	0	0	0	19
3. Total Number of Majors	0	0	0	0	19

	College Years				
Degrees Awarded	**04-05**	**05-06**	**06-07**	**07-08**	**08-09**
Engineering					
1. Undergraduate	12	8	13	11	13
2. Graduate	0	0	0	0	0
3. Total Number of Majors	12	8	13	11	13
Engineering Management					
1. Undergraduate	0	0	0	0	0
2. Graduate	0	0	0	1	5
3. Total Number of Majors	0	0	0	1	5

D. Student Faculty Ratios	Engineering				
1. Tenured/Track	6.7	8.3	9.7	15.7	24.3
2. Lecturer	18.7	29.1	0.0	28.4	43.1
3. SFR By Level (All Faculty)	7.2	8.9	9.7	16.7	26.0
4. Lower Division	2.9	6.8	7.7	7.1	17.5
5. Upper Division	10.3	11.3	11.6	16.0	29.3
6. Graduate	6.4	6.2	8.0	19.5	23.7

7. Number of Sections Offered	10	11	16	17	14
8. Average Section Size	12	13	10	11	22
D. Student Faculty Ratios	Construction Management (CGMT)				
1. Tenured/Track	0.0	0.0	0.0	0.0	0.0
2. Lecturer	0.0	0.0	0.0	0.0	14.4
3. SFR By Level (All Faculty)	0.0	0.0	0.0	0.0	14.4
4. Lower Division	0.0	0.0	0.0	0.0	0.0
5. Upper Division	0.0	0.0	0.0	0.0	0.0
6. Graduate	0.0	0.0	0.0	0.0	14.4
7. Number of Sections Offered	0	0	0	0	2
8. Average Section Size	0	0	0	0	27