

**El Camino College  
Industry and Technology Division  
Engineering Technology Department  
Program Review  
Spring 2009  
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## **I. Overview**

### **A. Description of Program**

Quoting the El Camino College Catalog:

"The Engineering Technology program prepares students for transfer to university engineering technology programs and for employment in technical fields. By completing the degree or certificate requirements, students acquire a foundation in the principles of engineering, engineering design, digital electronics, automated manufacturing, and the application of math and science in technical fields. Careers in engineering technology involve high level technical work in the creation, production, utilization, and distribution of industrial materials, products, and processes. Competencies will be assessed regularly in accordance with skill standards established by the National Alliance for Pre-engineering Programs."

We live in a world immersed in computers and technology that is used everywhere, everyday- but as more and more of technology is used, fewer people are capable of managing this technology. The Engineering Technology program was started in the fall of 2006 to respond to this need. Industry has reached a critical point where many of the workforce (25% or more in some industries) are eligible to retire now. Technology in industry is directly linked to the productivity and financial health of the nation and society.

The El Camino College Engineering Technology program currently consists of five courses: ETEC 10 "Principles of Engineering Technology" an overview covering the basics of all engineering, ETEC 12 "Introduction to Engineering Design" introducing the concepts of computer aided design, ETEC 14 "Electronics for Engineering Technologists" introducing the concepts of control of electronic devices, ETEC 16 "Computer Integrated Manufacturing" which shows the role of computers in robotics and manufacturing, and ETEC 18 "Engineering Design and Development" the capstone course integrating all of the skills learned in the four introduction classes. These classes prepare the student for productive employment in the expanding and continuous progression of the technical arts. Students can expect to complete the program and immediately enter the field as a technician or technologist, or transfer to a four year institution to continue on for an engineering degree with a solid foundation in technology.

### **B. Status of Previous Recommendations**

No previous program reviews have been completed. In its place a review of previous recommendations made during Engineering Technology Department Advisory Committee meeting conducted in the December 6th of 2007. From the Advisory Committee meeting the following suggestions were made:

1. Improve articulation with local high schools. Articulation agreements are in place and currently in work to strengthen uniformity and transition between institutions.
2. Support local high schools by providing training. El Camino College has supported the training of high school instructors for complementary technologies and course- This expense has averaged \$5K to \$10K per year.
3. Support local high schools with materials and class offerings. El Camino College has assisted local high schools in procuring the needed materials to teach engineering

technology classes, this support has averaged approximately \$20K to \$30K per year and is expected to diminish with increased implementation.

4. Recruit at El Camino College on-campus events such as Career Day and Majors Day. The Engineering Technology program has had representation at these events to further the marketing and exposure of the program.
5. Recruit at high schools. This is an important and traditionally underutilized outreach effort. Plans are in work to demonstrate to high school students the technologies and skills that El Camino College has to offer. An annual budget of \$5K is estimated to support this effort to visit high schools and show the career pathways that are possible.
6. Focus on fundamental skills. This is critical to technology in general. All of technology is a building process, and industry and education understand that these fundamental building blocks must be instilled in students in order to build their knowledge towards higher technology concepts.
7. Generate interest for manufacturing careers in high school students. This can be accomplished through the demonstration of “living projects” that continue and progress by a cycle longer than the typical college student’s attendance and evolve with the application of maturing and adapted technology. Further, these projects can be shared with high school students at recruitment events to show what prospective students have to look forward to.

Articulation, training support, materials and class support have been a high priority for the Engineering Technology program. These expenses as applied to local high schools are expected to diminish with implementation and subsequent investment in on campus resources will reach a sustainable level. This annual budget for sustained on campus support is estimated to be \$20K per year. El Camino has funded dozens of Engineering Technology classes, provided funding for materials, trained high school instructors and is continuously furthering articulation agreements. It is acknowledged that more work is needed in recruiting. With recent equipment acquisitions, and the level of experience that has been obtained, the program has enough material to be properly marketed.

Another Advisory Committee meeting was held November 12<sup>th</sup> 2008. From this meeting many of the same suggestions were made. Additional points were:

1. Teach automation maintenance. This is currently being evaluated, if commitment is decided upon, \$15K initial investment is estimated, with an \$5K annual budget is projected for such support.
2. Teach/demonstrate systems integration. This is a long term goal of the El Camino College program, and the inevitable direction of automation technologies and dependent on the evolution of the state of the art.
3. Utilize “living projects” that transcend students entering and exiting the program
4. Recruit high school students by demonstrating context and relevance through outreach activities.

Additional classes focusing on automation maintenance and systems integration are possible in the future, the need of these additions are dependent on further polling of the greater industry. The core classes and catalog offering should be addressed and matured before this task is taken on. The subjects of automation maintenance are introduced in context of the current classes but may require further addressing as industry demands.

“Living projects” that show the multidisciplinary nature of technology are currently in development by faculty. These projects implement technologies that can supplement current courses and build to the point of developing future courses as they mature. It is anticipated that some of these projects will be ready by the spring of 2009 to be used for recruiting to show context and relevance to high school students.

## II. Program Statistics

### A. Demand: FTES by Course/Program

Instructions: Analyze the **FTES by Course/Program** using 1<sup>st</sup> census data and answer the following questions. At a minimum, your analysis must include a 3-year cycle comparing like semesters. Due to the lack to available data for this new program, sequential fall and spring semester data has been used for this analysis.

	FALL 2006	SPRING 2007	FALL 2007	SPRING 2008
ETEC 10		2.97	5.74	No data
ETEC 12	4.46	3.11	No data	2.9
ETEC 14				
ETEC 16				
ETEC 18				
DEPT	4.46	6.08	5.74 + ?	2.9 + ?

1. Given the data, can you recognize any trends in course demand in any of the Program's courses?

The data is incomplete, but suggests that the program is holding steady or growing.

2. What are you doing to respond to trends?

The Engineering Technology department (started in fall of 2006) is still a relatively new program that has yet to offer all of the planned courses. Although the economy is currently experiencing a significant downturn, advances in technology and impending retirements of current workers will further the needs for new trained employees. Increased marketing and awareness efforts are needed to make prospective students aware that excellent employment and career opportunities will continue to become available. These expenditures for marketing are expected to average \$5K per year to cover the costs of materials and distribution.

3. Should a recommendation be written addressing the data? \_\_\_\_ Yes      X   No  
(If yes, list.)

No further recommendations are required at this time.

## B. Offerings: Fill Rate\*

Instructions: Review and analyze the **fill rate data** (including the fill rate per course for both day and evening), provided by Institutional Research for this program for a three year cycle and answer the following questions:

Day and night course offerings do not exist in the present format. Engineering Technology is still a relatively new program and the data available is only for the past four consecutive semesters.

Average fill rate of courses in program: How does this program compare to:

No fill rate data is available at this time.

The seat count for the department for the past four semesters:

	FALL 2006	SPRING 2007	FALL 2007	SPRING 2008
ETEC 10		14	32	266
ETEC 12	24	15	10	169
ETEC 14				7
ETEC 16				12
ETEC 18				12
DEPT	24	29	42	466

1. Given the data, is the program in a growth mode?   X   Yes        No  
**Comment.**

Yes, the data clearly shows that the program is in a growth mode.

2. What adjustments are indicated?  
**Explain.**

The data indicates that this is a new program with growing appeal. This program needs the proper support of staff and resources to meet this demand. Further growth or maturity should be planned for and anticipated if possible. Unfortunately, technology is not entirely predictable, and some latitude is required to adjust for the changing and dynamic needs of industry and progress. Complementary recommendations to these effects have been stated in Plan Builder.

3. Should a recommendation be written that addresses the data?   X   Yes        No  
**(If yes, list.)**

A rapidly evolving and expanding program such as Engineering Technology will require the efforts of all involved to manage it, and to deliver the best possible educational opportunities to students. Creative contributions to technology are necessary to advancement, and complementary additions by all the faculty and staff is encouraged.

### C. Scheduling: Student Satisfaction with Scheduling

Instructions: Complete the chart below. Indicate the time when sections of courses in the program are currently scheduled to start. Analyze the data provided by Institutional Research on student satisfaction with scheduling in the program and answer the questions.

1. What (if anything) is indicated by the student satisfaction with scheduling?

A survey of student satisfaction with scheduling has not been conducted to date due to the short existence of the program. Some results can be found in the results in attendance and different types of students that have attended at the different time offerings. Two time formats have been offered for ETEC 10, these are Saturdays and Monday/Wednesday early afternoons. The ETEC 12 class has been offered on Saturdays. The early afternoon classes have experienced low attendances which matches the small relative population size of the campus at this time of day. These classes have been attended by entry college students. The Saturday classes have been roughly double the numbers and attended by half entry college students and half high school students.

2. Are there time periods of high student demand which are not being addressed? \_\_\_\_ Yes   X   No  
How could such demand be addressed?

No, there is no information that there is a period of student demand that is not being addressed. Students have indicated dissatisfaction that sections have been cancelled or shifted due to fill requirements.

3. Should a recommendation be written addressing this area?   X   Yes \_\_\_\_ No  
(If yes, list.)

Yes, the recommendation is to conduct a survey of student satisfaction with scheduling in the future. This is a topic for discussion at the next department meeting.

### D. Retention and Success

#### 1. Retention

Instructions: Review and analyze the data on **retention (course completion with a grade other than W)** over a three-year cycle comparing day to evening classes, term to term (e.g. fall to spring, spring to summer, etc.), and course levels.

Due to the relatively new nature of the program, the only the data of the past four semesters is available:

	FALL 2006	SPRING 2007	FALL 2007	SPRING 2008
ETEC 10		71.4%	59.3%	99.2%
ETEC 12	79.2%	100%	100%	99.4%
ETEC 14				100%
ETEC 16				100%
ETEC 18				100%
DEPT	79.2%	86.2%	61.9%	98.7%

1. Given the data, what trends are observed?

Comment.

The data suggests an increase in retention. Due to the rapid growth shown, this trend should be re-evaluated when the program becomes more stable to ensure quality of service. Currently, only two of the five courses of the program are offered on campus regularly, only after all the approved courses are offered and students complete the program can it be properly assessed.

2. Should a recommendation be written addressing the data? \_\_\_\_\_ Yes        X   No  
(If yes, list.)

No further recommendation is required at this time.

## 2. Success Rate

Instructions: Review and analyze the data on **success rate (students who earned a grade of A,B,C, or Credit)** over a three-year cycle comparing day to evening classes, term to term (e.g. fall to spring, spring to summer, etc.), and course levels and answer the following questions:

Due to the relatively new nature of the program, the data of the past four semesters is presented:

	FALL 2006	SPRING 2007	FALL 2007	SPRING 2008
ETEC 10		71.4%	50%	97%
ETEC 12	45.8%	46.7%	50%	97%
ETEC 14				100%
ETEC 16				75%
ETEC 18				100%
DEPT	45.8%	58.6%	50%	96.6%

1. What trends are observed?

The program shows a trend of increasing success rate. Due to the rapid growth shown, this trend should be re-evaluated when the program becomes more stable to ensure quality of service.

2. Should a recommendation be written addressing the data?   X   Yes      \_\_\_\_\_ No  
(If yes, list.)

Due to the dynamic nature and rapid growth of the program, this data should be re-evaluated after more data has been collected.



### **III. Curriculum**

#### **A. Course and Content**

##### **1. Courses Not Offered**

Instructions: Indicate the total number of courses in the program and list all courses in the program which are in the catalog but have not been offered in the last three years. Refer to this list to answer the following questions:

There are five courses in the program:

Engineering Technology 10, Principles of Engineering Technology  
Engineering Technology 12, Introduction to Engineering Design  
Engineering Technology 14, Electronics for Engineering Technologists  
Engineering Technology 16, Computer Integrated Manufacturing  
Engineering Technology 18, Engineering Design and Development

The program started with one course offering and has added roughly one additional course each semester. There are no courses that have not been offered in the last three years.

1. Given the data, are there courses that should be inactivated? \_\_\_\_\_ Yes        X   No  
**Comment.**

No, this is a relatively new program in a growth mode.

2. If there are courses not offered in the last three years that you do not wish to inactivate, What reasons are there to keep them active?

This is not applicable.

3. Should a recommendation be written addressing the data? \_\_\_\_\_ Yes        X   No  
(If yes, list.)

No recommendation is necessary at this time.

##### **2. Course Revisions and Additions**

Instructions: Utilize the Course Review Chart from the Curriculum Office to answer the following:

1. Are there course outlines that should be revised? \_\_\_\_\_ Yes        X   No  
(If yes, list.)

No, these courses were recently added and do not require their outlines to be immediately revised.

2. Are there courses inconsistent with current practice in the field? ☐ Yes ☒ No  
**Explain.**

No, in general the courses are solid in their focus and content, but regular review of course outlines is advised to prevent them from diverging from current practice in rapidly evolving industries.

3. Should new courses to be added to the program? ☐ Yes ☒ No  
**Explain.**

No, not at this time, but due to the rapid evolution of manufacturing technologies, it is recommended that a continuous process of researching future needs of students and industry be made to prevent the delay of adoption of these technologies at the instructional level. This evaluation of emerging technologies and the instructional needs for them should be conducted at a minimum of each year, preferably after advisory committee meetings.

4. Are adjustments necessary to the conditions of enrollment (Prerequisite, Co requisite, Recommended Preparation, and Enrollment Limitations) for a specific course to increase student success?

☐ Yes ☒ No ☐ Uncertain **Comment.**

No immediate adjustments are necessary.

5. If the program offers a degree and/or certificate, list them and indicate when the requirements were last reviewed? (If not applicable, skip to Question 7.)

The Engineering Technology Department offers an A.S. Degree, and a certificate of Achievement. For each of these there is an Engineering Technician Option and an Engineering Technology Option. These degrees and certificates were last reviewed and revised November 11, 2008.

6. Are these degree and/or certificate requirements inconsistent with current practice? ☐ Yes ☒ No  
**Explain.**

No, these degrees and certificates reflect current industry practices.

7. Is there a need to create or delete a degree and/or certificate? ☐ Yes ☒ No  
**Explain.**

No, there is not a need to create or delete a degree and/or certificate at this time.

8. Should any recommendations be written that address the above responses? ☐ Yes ☒ No  
(If yes, list.)

No recommendation is necessary at this time.

## B. Articulation

Instructions: Articulation is the process by which courses taken at ECC can be used to satisfy subject matter requirements at another college or university. This is important in the transfer process for students. To help you in this area, you can review articulation agreements at [www.assist.org](http://www.assist.org), the California Articulation Number Guide or meet with the Articulation Officer, Lori Suekawa (ext. 3517).

1. Are there any courses in your curriculum which are part of a lower division preparation for the major that are not articulated with our major transfer institutions?

According to [www.assist.org](http://www.assist.org) all the Engineering Technology classes are transferable credits to the CSU system. As of records from 5/30/07 articulation agreements are in progress with Hawthorne High School for ETEC 10 and 12.

2. What problems, if any, are there in articulating these courses?

No problems exist for the articulation of these courses; this is an ongoing effort to coordinate with other institutions as the program grows.

3. Should a recommendation be written addressing above responses? \_\_\_\_\_ Yes      X   No  
(If yes, list.)

No recommendation is necessary at this time.

## C. Instruction and Assessment

### 1. Learning Methods

1. What learning methods are incorporated inside and outside the classroom in the program to promote? Student success?    **Explain.**

Many of the Engineering Technology classes are hands on learning with approximately 75% of class time spent with laboratory work. Laboratory planned instructional activities include: group demonstrations, individual instruction, exercises and projects. Classroom planned instructional activities include: lectures, class discussions, guest speakers, and video presentations. Outside classroom learning methods include: study of notes, answering homework problems, required reading, written research projects, and fieldtrips for plant tours and trade shows.

2. Should a recommendation be written addressing above response? \_\_\_\_\_ Yes      X   No  
(If yes, list.)

No recommendation is necessary at this time.

## 2. Assessment

1. How do you evaluate the extent to which the learning objectives, skills, and competencies are being met?

### A) Courses

Students are evaluated by written homework, research reports, computational homework, laboratory exercises, laboratory projects, examinations, quizzes, laboratory reports, and class performance.

### B) Program

Faculty continuously evaluate the components that comprise the degrees and certificates of the program to determine if they are guiding students to acquiring the skill sets they will need to be successful in industry. Post-graduation student data helps guide the program in technical directions and indicates potential strengths and weaknesses of the programs components.

2. How do you use the results of the above evaluation to improve student learning and the quality of the program?

At a course level, evaluations can indicate whether a class or individuals have learned material or skills. If required the methods of teaching can be adjusted if necessary or remedial work may be required. Due to the fast technological pace of student's general environment, it is apparent that student-learning methods are in a state of flux. Teaching methods are continuously being adapted and qualified to adjust for this state.

3. Should a recommendation be written addressing this area? \_\_\_\_\_ Yes        X   No  
(If yes, list.)

No recommendation is necessary at this time.

## IV. Program Requirements

### A. Instructional Support

1. Identify key instructional support areas used by the program.

#### Libraries & Programs:

X	Library	X	Special Resource Center		Basic Skills Study Center		Library Orientation
	Music Library		Puente Program		Honors Transfer Program	X	Other (Please list.) Women in Technology
X	Learning Resource Center Media Materials Collection		Assessment/Testing Office	X	Counseling	X	Other (Please list.) Job Placement
X	EOP&S/CalWORKS	X	Transfer Center	X	First Year Experience		
	Learning Communities		Project Success		Honors Transfer Program		

**Computer Labs & Tutoring:**

	LMTC Computer Commons	X	SRC High Technology Center		Other Computer Lab: Please list.	X	Writing Center
	CAI MAC Lab		Writing Lab				LRC Tutorial Program
	CAI Windows Lab		Math & Science Lab			X	Math Tutoring
	TOP Lab		Keyboarding Center				SRC Tutorial Program
	Hawthorne BTC					X	EOP&S Tutoring
	Inglewood Center						

**Faculty Support Services:**

	Graphic Arts	X	Copy Center		Distance Education		Other (Please list.)
	Media Services AV Production	X	Tech Services Help Desk	X	Teleconferences		
	Media Services AV Equipment Distribution	X	Support Staff	X	Webconferences		
X	ECC Vehicles	X	ECC hosted Websites	X	Staff Development		
X	ECC E-mail						

2. Do you have some instructional support needs that are not being met? \_\_\_\_ Yes \_\_\_\_ X No

**Comment.**

No, no instruction support needs are currently unsupported.

3. Should a recommendation be written to address your needs? \_\_\_\_ Yes \_\_\_\_ X No  
(If yes, list.)

No recommendation is necessary at this time.

**B. Facilities and Equipment**

1. Does the program make effective use of its facilities and equipment? **Explain.**

Yes, faculty makes an effort to expose students to the breadth of engineering, technology and manufacturing methods. This includes addressing individual student needs and interest beyond the scope of the basic course outlines. Due to the fast pace development of technologies and interaction between specific disciplines a wide exposure to different resources and equipment is critical.

2. Are adequate facilities, equipment and supplies available for the program? \_\_\_\_ Yes \_\_\_\_ X No  
**Explain.**

No, the program has equipment and supply needs in order to stay current in technology. These needs include automation and robotic equipment, laboratory support equipment and supplies. The program has a need for industrial robots and work-cell equipment that are becoming standards of manufacturing. Currently these needs are being sought to be fulfilled through the application of several grants and funding sources. Please refer to the current Plan Builder entries for detailed equipment and supply needs.

3. Are the facilities and equipment adequately maintained?   X   Yes        No  
**Explain.**

Yes, the department has the support of several technicians that adequately maintain the facilities and equipment.

4. Should a recommendation be written addressing the data?        Yes   X   No  
(If yes, list.)

No recommendation is necessary at this time.

### C. Staffing

Instructions: Analyze the data on **FTEF, adjunct FTEF, and the FT/PT ratio** for the most recent fall semester and answer the following questions:

**FTEF (full-time equivalent faculty):** #   0.667   (incomplete data for fall 2008)

**Number of full-time FTEF:** #   0.667   **Number of adjunct FTEF:** #   0.00  

**FT/PT load ratio:**           

1. How do the program numbers compare to a like semester (Fall to Fall) three years ago or the previous program review?

There is not one faculty that teaches the majority of their load in the Engineering Technology department, a number of faculty from other “home” departments contribute.

2. What do the program data indicate? Comment on any trends or unusual data.

Not applicable.

3. How does the FT/PT ratio benefit or harm the program?

Not applicable.

4. Do you have a faculty mentoring program?   X   Yes        No  
**Describe.**

Yes, informal mentoring occurs on a continuous basis, as faculty share information on emerging technologies, curriculum and teaching strategies. There are currently four faculty that directly take part in training and preparation for the Engineering Technology program.

5. How do faculty maintain currency in their field?

Trade shows, trade publications, curriculum research grants, technical research, and meetings with local industry employers.

6. Fill in the faculty status data below and answer the questions that follow.

Name	Reassigned time (how much in ) 2005/2006	Currently on leave (check)	Retired in last 2 years (check)	FT hired last 3 years (check)	Anticipated to retire in next 3 years (check)
Full Time Faculty					
Carlson, Eric					
Cocca, Steve					
Hofmann, Harold					
Hughes, Rick					
Part Time Faculty					
None					

6a. How does this data impact the program?

There is no data to report in the table above. There currently is no part time faculty supporting the Engineering Technology program. The data does not suggest any imminent impact.

6b. Will this data affect the program in the future?

The data does not suggest any apparent future impact.

7. From this information, can you identify present and future staffing needs?   X   Yes        No  
**Explain.**

The faculty represents a broad range of experience and capabilities with the ability to address present and future program staffing needs.

8. What is the department doing to address any future staffing needs?

No immediate change in future staffing needs is anticipated.

9. Should a recommendation be written addressing the data?        Yes   X   No  
(If yes, list.)

No recommendation is necessary at this time.

## D. Planning

1. Do the program faculty and other personnel have a clear idea of what is happening in the program, where it is headed, what external changes are affecting it, and what changes need to be made in order to enable the program to adapt and continue to be successful? **Explain.**

Yes, faculty either have recently departed from industry, continue to work with industry, or keep in touch with current industry trends and needs. An Industrial Advisory Committee is utilized to survey the needs of employers. The most recent meeting was held November 2008.

2. What data, not currently provided, would be needed in order to improve planning for the development of the program? **Explain.**

More information on the different student populations served by the program and how these populations could be better reached to provide them information about the program. This data should be collected during the next survey.

3. What major external changes or trends do you expect to be of particular relevance to your discipline in the next five years?

In the next five years many technicians and engineers will be required to fulfill industry needs. More automation design, setup, maintenance technicians will be needed. This rapidly emerging need has already reached a crisis level. Graduates will be sought after for their problem solving abilities as well as their manual skill. Fundamental skills will continue to be important, but understanding of their influence at the complex system level will be critical.

4. What will the implications of these changes or trends be for the program and how will the program need to respond?

An increasing requirement will be to anticipate, rather than react to student and industry needs. With the delays of the student learning cycle, program and institutional adoption, in a fast paced competitive environment, the need to be proactive is magnified.

5. Based upon the information above, how would you like the program to evolve within the next five years?

To continue to introduce students to the fundamentals of engineering technology, and build upon these to instruct in complex competitive technologies, problem solving and engineering design.

6. Should a recommendation be written addressing the data? ☐ Yes ☒ No  
(If yes, list.)

No, a recommendation is not required at this time but this issue should be revisited in the future with program maturity.



## **V. Conclusion**

The Engineering Technology Department is positioned to offer students and industry support that is needed in a rapidly evolving environment of technology.

### **1. Prioritized Recommendations**

The prioritized recommendations for the program are:

1. Improved marketing of the program with an annual estimated cost of \$5K.
2. Offer the full program of courses on a regular basis
3. Strengthen relationships with local feeder schools
3. Strengthen relationships with local industry
4. Update facilities to include automation, robotics, and technology. Refer to the Engineering Technology Plan Builder for current details and costs of these evolving needs.

### **2. Major Needs**

1. Dedicated internship coordinator time to develop industry relationships. This support is estimated to be \$20K annually.
2. Laboratory support equipment. Refer to the Engineering Technology Plan Builder for current details and costs.
3. Course specific software. Refer to the Engineering Technology Plan Builder for current details and costs.

### **3. Strategies**

Intercampus efforts

Joint cooperation with CADD Department

Joint cooperation with Electronics Department

Joint cooperation with Machine Tool Technology Department

Joint cooperation with Manufacturing Technology Department

Develop long-term internship programs

Further develop website presence to advertise program and open communication

Email regular newsletter of class offerings and current work

Develop curriculum and projects to be implemented within the next two years.