



**Comprehensive Program Review and Analysis**  
(6 year review)

**Engineering and CIS**

**Engineering, CIS**

**March 31, 2013**

**Amelito Enriquez**

**Bill Schwarz, Kamran Eftekhari**



## COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

The Comprehensive Program Review and Analysis builds upon five years of program annual planning, providing a framework for faculty to use to review program information and to articulate direction for the future. The purposes of the Comprehensive Program Review and Analysis is well described by past Academic Senate presidents Jim Locke and Bill Scroggins (Academic Senate for California Community Colleges):

*The principal purposes of the review process are to recognize and acknowledge good performance, to enhance satisfactory performance and help programs which are performing satisfactorily further their own growth, and to identify weak performance and assist programs in achieving needed improvement, ...*

*The program review process shall promote professionalism, enhance performance, and be effective in yielding a genuinely useful and substantive process for determining program effectiveness, the program review process shall provide 1) an articulation of clear, relevant criteria upon which reviews will be based; 2) the establishment of reasonable and timely intervals; 3) the establishment of the specific purposes for which program reviews are conducted and articulation of those purposes to everyone involved, ...*

This document is to collect information to be used by the college planning bodies IPC, SSPC, Budget, and CPC and may be used for Program Improvement and Viability (PIV). Through this process, faculty have the opportunity to review the mission and vision of their program. Then, using multiple measures and inquiry, faculty will reflect on and evaluate their work for the purposes of improving student learning and program effectiveness. This reflection will identify steps and resources necessary to work towards the program vision including personnel, professional development, instructional equipment, and facilities needs. *Faculty should use their judgment in selecting the appropriate level of detail when completing this document.*

**The deadline for submission of the Comprehensive Program Review and Analysis is due to the Dean/VPI (Learning Center, Library, University Center) by the end of March.** Complete this document in consultation with your Dean/VPI. Documents will be reviewed by the Dean/VPI and uploaded to the Curriculum Committee and the IPC SharePoint sites. The College will hear faculty reports on their Comprehensive Program Review and Analysis during the Spring semester in a Curriculum Committee meeting.

### **Cañada College Mission Statement**

It is the mission of Cañada College to ensure that students from diverse backgrounds have the opportunity to achieve their educational goals by providing quality instruction in general, transfer, career, and basic skills education, and activities that foster students' personal development and academic success. Cañada College places a high priority on supportive faculty/staff/student teaching and learning relationships, responsive support services, and a co-curricular environment that contributes to personal growth and success for students. The College is committed to the students and the community to fulfill this mission.

### **Vision**

Cañada College ensures student success through personalized, flexible, and innovative instruction. The College infuses essential skills and competencies throughout the curriculum and assesses student learning and institutional effectiveness to make continuous improvement. Cañada responds to the changing needs of the people it serves by being involved in and responsive to the community, developing new programs and partnerships and incorporating new technologies and methodologies into its programs and services.



## COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

Note: To complete this form, **SAVE** it on your computer, then send to your Division Dean/VPI as an **ATTACHMENT on an e-mail message.**

**Program Title** Engineering and CIS **Date Submitted** March 31, 2013

### 1. Planning Group Participants (include PT& FT faculty, staff, students, stakeholders)

List of names and positions:

Amelito Enriquez - Engineering FT faculty

Bill Schwarz - CIS FT faculty

Kamran Eftekhari - Engineering PT faculty

### 2. Contact Person (include e-mail and telephone):

Amelito Enriquez, enriquez@smccd.edu, 650-306-3261

### 3. Program Information

#### A. Program Personnel

Identify all personnel (faculty, classified, volunteers, and student workers) in the program:

**FT Faculty** Amelito Enriquez, Bill Schwarz,

**PT Faculty FTE** Brett Baker (.36), Kamran Eftekhari (.36), Thomas Sanford (.29), Lance Lund (.29), Ridge McGhee (.29)

**FT Classified** none

**PT Classified (hrs/wk)** Justine Walsh (20 hrs/wk, shared with Physics) **Volunteers** none

**Student Workers** none

#### B. Program mission and vision

Include the purpose of the program, the ideals the program strives to attain, and whom the program serves. The program mission and vision must align with the college's mission and goals. (200 word limit)

Cañada College's Engineering and CIS programs are transfer programs that offer the lower-division courses needed by students to transfer to four-year computer science programs or engineering programs in any field of engineering. The mission of the two programs is to educate students from a diverse population to become productive members of the engineering/computer science professions and society at large. Each department combines excellence in teaching theoretical principles and concepts with practical hands-on experience and the development of technical proficiency and communications skills. The departments work closely with the College's Mathematics, Physics, and Chemistry departments, as well as the College's Student Services Division and four-year engineering and computer science programs to maximize students' opportunity for timely completion of courses and successful transfer. Although primarily transfer programs, courses are also available for students who are seeking to update job skills related to engineering and computer science. Engineering and computer science students



### COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

receive academic support services and professional development opportunities from the College's STEM Center (including the Mathematics, Engineering, and Science Achievement (MESA) Program).

#### C. Program Student Learning Outcomes

List Program Student Learning Outcomes (minimum of 3) and assessment tools for each.

Tool: <https://sanmateo.tracdat.com/tracdat/>

<b>PLO: Students completing this program will be able to:</b>	<b>Assessment Plans*</b>
Apply knowledge of math, science, and engineering or computer science to identify, formulate, and solve engineering/computer science problems.	Assessed cumulatively through scores in tests, assignments and projects in courses.
Communicate effectively and work well in situations that require teamwork.	Group Projects/Labs: Lab courses CIS 250 Engr 100, 111, 210, 261, 270
Design and perform tests or experiments, analyze and interpret data, and prepare a report summarizing the results of the tests or experiments.	Labs/lab reports/programming assignments CIS 118, 250 Engr 100, 111, 210, 261, 270
Develop a design or system given a set of requirements and specifications.	Projects (individual or group) CIS 118, 250 Engr 100, 210, 270
Formulate a plan of study to obtain a Bachelor's degree in engineering or computer science.	Current and accurate SEPs; % of students with SEPs; % who successfully complete AS or transfer requirements; Average number of semesters at Cañada before transfer; Project in Engr 100 on Engineering majors and SEPs
Use techniques, skills, and modern engineering and computer tools necessary for engineering or computer science practice	Projects in Engr 100, 210, 270, 261, CIS 250

\*ePortfolios are currently being piloted for engineering students. Students in the fall 2012 Engr 210 class were all required to develop their ePortfolios using Google Sites. These students will be encouraged to update their ePortfolios as they progress through the program.

Reflections:



## COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

- Review 5-year data and identify changes that have occurred in your program as a result of annual SLO assessment cycle.
- Explain how the assessment plan for Program Student Learning Outcomes measures quality and success of each Program.
- Summarize assessment results of Program Student Learning Outcomes.
- Describe and summarize other data that reveals Program performance.

Most of the course-level SLO assessment results have been satisfactory. Of the 33 course-level SLO results that have been collected, only three have not met the criterion for success. Course level SLO assessments that have yielded unsatisfactory results have been used to make changes in specific courses (length, depth and order of coverage of topics; methods of delivering content and assessing student learning, etc.)

Due to limited Program Student Learning Outcomes assessment results, the annual SLO assessment cycle has not resulted in any major changes in the programs. Preliminary Program Student Learning Outcomes assessment results have been collected and uploaded to Tracdat for PLOs #1, #2, and #3 using data for engineering students who transferred or received an AS degree at the end of spring 2012. More assessment results will be available for students receiving their AS degrees at the end of spring 2013.

#### 4. Curricular Offerings and Student Learning Outcomes and Assessment Cycle

Tools: TracDAT <https://sanmateo.tracdat.com/tracdat/> CurricUNET <http://www.curricunet.com/smcccd>

**All curriculum and SLOAC updates must be completed when planning documents are due.**

##### A. Attach the following TracDat and CurricUNET data in the appendix:

- List courses, SLOs, assessment plans, and results and action plans (attach report from TracDat for the CURRENT year only. The others will be in your previous annual plans).
- List courses with CORs over 6 years old (data from CurricUNET)

All courses have CORs that are less than 6 years old.

##### B. Identify Patterns of Curriculum Offerings

Reflections:

- Review the 2-year curriculum cycle of course offerings to ensure timely completion of certificates and degrees.
- Identify strengths of the curriculum.
- Identify issues and possible solutions.
- Discuss plans for future curricular development and/or program modification.

#### Engineering curriculum cycle of course offerings

Fall Semester	Spring Semester
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<ul style="list-style-type: none"> <li>• Engr 111 - Surveying</li> <li>• Engr 210 - Graphics</li> <li>• Engr 410 - Computer-Aided Graphics</li> <li>• Engr 413 - Designing with CAD</li> <li>• Engr 240 - Engineering Dynamics</li> <li>• Engr 270 - Materials Science</li> </ul>	<ul style="list-style-type: none"> <li>• Engr 100 - Introduction to Engineering</li> <li>• Engr 215 - MATLAB</li> <li>• Engr 230 - Statics</li> <li>• Engr 260 - Circuits and Devices</li> <li>• Engr 261 - Circuits and Devices Lab</li> </ul>
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**Strengths of the Engineering Curriculum:**

- Curriculum is kept current by working closely with other community colleges and four-year engineering programs.
- All lecture courses are offered simultaneously as online courses, giving students flexibility in their schedules, and allowing students from other institutions to take the courses.
- Course offerings are coordinated with CSM's Engineering Department to provide maximum opportunity for students in the District to complete their transfer requirements in a timely manner.

**Curriculum Issues**

- For Engineering, a statewide AS degree for transfer is still under development. Two Transfer Model Curriculum (TMC) patterns for engineering are being developed - one for Electrical/Computer Engineering, and one for Aerospace/Civil/Mechanical Engineering. The most difficult aspect in developing these TMCs is staying within the 60-unit limit.
- A few universities (UC Berkeley, UCLA and Cal Poly San Luis Obispo) now have a course in Strength of Materials as one of their lower-division transfer requirements for mechanical and civil engineering students. The department should explore the viability of offering this course to ensure that students transferring to these universities are well prepared.

**Current CIS curriculum cycle of course offerings**

<p><b>Fall Semester</b></p> <ul style="list-style-type: none"> <li>• CIS 118 – Intro to Object Oriented Programming</li> <li>• CIS 250 – Programming Methods I</li> <li>• CIS 252 – Programming Methods II</li> <li>• CIS 286 – Programming Methods II Java</li> <li>• CIS 321 – Programming for the iPhone</li> </ul>	<p><b>Spring Semester</b></p> <ul style="list-style-type: none"> <li>• CIS 118 – Intro to Object Oriented Programming</li> <li>• CIS 250 – Programming Methods I</li> <li>• CIS 321 – Programming for the iPhone</li> </ul>
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**Strengths of the Computer Information Systems Curriculum:**

- Curriculum is kept current by working closely with other community colleges and four-year engineering programs, and reviewing the Transfer Degree Model.
- All lecture courses use the online systems, giving students 24/7 access to all course material.



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- Course offerings are coordinated with Canada's Engineering Department, and the Computer Graphic Department to provide maximum opportunity for students in the District to complete their transfer requirements in a timely manner.

### Curriculum Issues

- For Computer Information Systems, a statewide AS degree in 'Computer Science', has been developed, and is replacing the current CIS degree for transfer, along with 3 new Computer Science Certificates: CS C++, CS Java, CS Objective C. The Computer Science AS Degree matches the Transfer Model Curriculum (TMC) patterns for Computer Science.

## 5. Program Level Data - Engineering

### A. Data Packets and Analysis from the Office of Planning, Research & Student Success and any other relevant data

Tool:

[http://www.canadacollege.edu/inside/research/programreview/info\\_packet/info\\_packet.html](http://www.canadacollege.edu/inside/research/programreview/info_packet/info_packet.html)

#### Reflections:

- Review 5-year data to describe trends in student success, retention, demographics.
- Analyze trends and discuss plans to address significant findings.

## ENGINEERING PROGRAM LEVEL DATA

### a. Enrollment

Enrollment has been increasing steadily over the last five years, with unique headcount increasing by 107%, and the total enrollment count increasing by 123%. The WSCH peaked at 1556 in 2010-2011, which represents an increase of 136% from 2007-2008 AY. However, the WSCH decreased to 1290 in 2011-12, representing a 17% decrease from the previous year although still 95% higher than the 2007-08 WSCH.

Metric	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Unique Headcount	81	97	135	151	168
Total Course Enrollment	127	149	243	284	283

To understand the cause of the slight decrease in enrollment from 2010-2011 to 2011-2012, the enrollment data have to be separated into fall and spring semesters. The table below shows the fall semester enrollment trend from fall 2007 to fall 2011, and the spring semester enrollment numbers are shown in the next table. Dramatic decreases in both total course enrollment and WSCH are observed in fall 2011, while for spring semester, total course enrollment continues to increase. The decrease in enrollment in fall 2011 is attributed to the enforcement of pre-requisite requirements for all courses at Cañada, which resulted in some students unable to register for engineering courses. Among these students are students in the District who have not completed the official pre-requisite courses, as well as



## COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

non-District students who may have completed the courses equivalent to the required pre-requisites but had difficulty signing for Cañada courses because of the extra step needed to have their courses validated. This is particularly important for online students who could not readily come to campus and work on having this extra step accomplished in person.

<b>Metric</b>	<b>Fall 2007</b>	<b>Fall 2008</b>	<b>Fall 2009</b>	<b>Fall 2010</b>	<b>Fall 2011</b>
Unique Headcount	39	47	73	73	70
Total Course Enrollment	47	56	86	108	86

<b>Metric</b>	<b>Spring 2008</b>	<b>Spring 2009</b>	<b>Spring 2010</b>	<b>Spring 2011</b>	<b>Spring 2012</b>
Unique Headcount	58	70	88	109	125
Total Course Enrollment	80	93	144	164	188

Note that an analysis of the enrollment per section is not included in this review because the numbers included in the Program Review Data packets are misleading. Many of the engineering lecture courses have two sections, one for on-campus and one for online students. These two sections, although listed as separate sections, are only counted as one load for the faculty. Hence, a direct comparison of the department's number of students per section with that of the College's average number of students per section would be misleading. A more appropriate comparison would be the department load, which is covered in the next section.

### b. Department Efficiency

The table below summarizes the trend in the Engineering Department efficiency for the last five years. Both the WSCH and Load increased steadily from 2007-08 to 2010-11, and decreased in 2011-2012. From 2007-08 to 2009-10 academic years, the department's load is more than 10% lower than the College average load for the same period. For both 2010-11 and 2011-12 academic years, the department's load is higher than the college's average load.

<b>Metric</b>	<b>2007-2008</b>	<b>2008-2009</b>	<b>2009-2010</b>	<b>2010-2011</b>	<b>2011-2012</b>
WSCH	660	843	1124	1556	1290
FTE	1.64	2	2.3	2.4	2.3
Load	403	442	480	659	551

The decrease for the 2011-2012 is again primarily due to the enforcement of the prerequisites which significantly impacted enrollment only in fall 2011. In fact, if separate analyses of fall 2011 and spring 2012 are done (see the next two tables below), fall 2011 department load is more than 10% lower than the College average, while for both spring 2011 and spring 2012, the department load are more than 10% higher than the College's average.

<b>Metric</b>	<b>Fall 2007</b>	<b>Fall 2008</b>	<b>Fall 2009</b>	<b>Fall 2010</b>	<b>Fall 2011</b>
WSCH	289	375	428	761	513





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FTE	0.84	0.85	1.21	1.21	1.21
Load	334	439	353	627	423

Metric	Spring 2008	Spring 2009	Spring 2010	Spring 2011	Spring 2012
WSCH	371.00	468	696	795	777
FTE	0.76	1.15	1.09	1.19	1.09
Load	464	409	602	672	674

c. Student Performance Profile

Metric	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Success Rate	75.0%	77.0%	73.0%	82.0%	80.0%
Retention Rate	80.0%	87.0%	76.0%	85.0%	86.0%

The Engineering Department's Student Performance Profile compares very well with the College's averages. Retention and Success rates for the department have been consistently higher than the College's for all five academic years. Success rate for the last two years are more than 10% higher than the College rate. The significant increases in both Retention and Success Rates for engineering courses may be attributed to the successful implementation of CCC Confer to deliver and archive lectures, allowing students from both on-campus and online sections to review recorded lectures on their convenience. The success and retention rates for the department can still be further improved if adjunct faculty implement CCC Confer to archive their lectures.

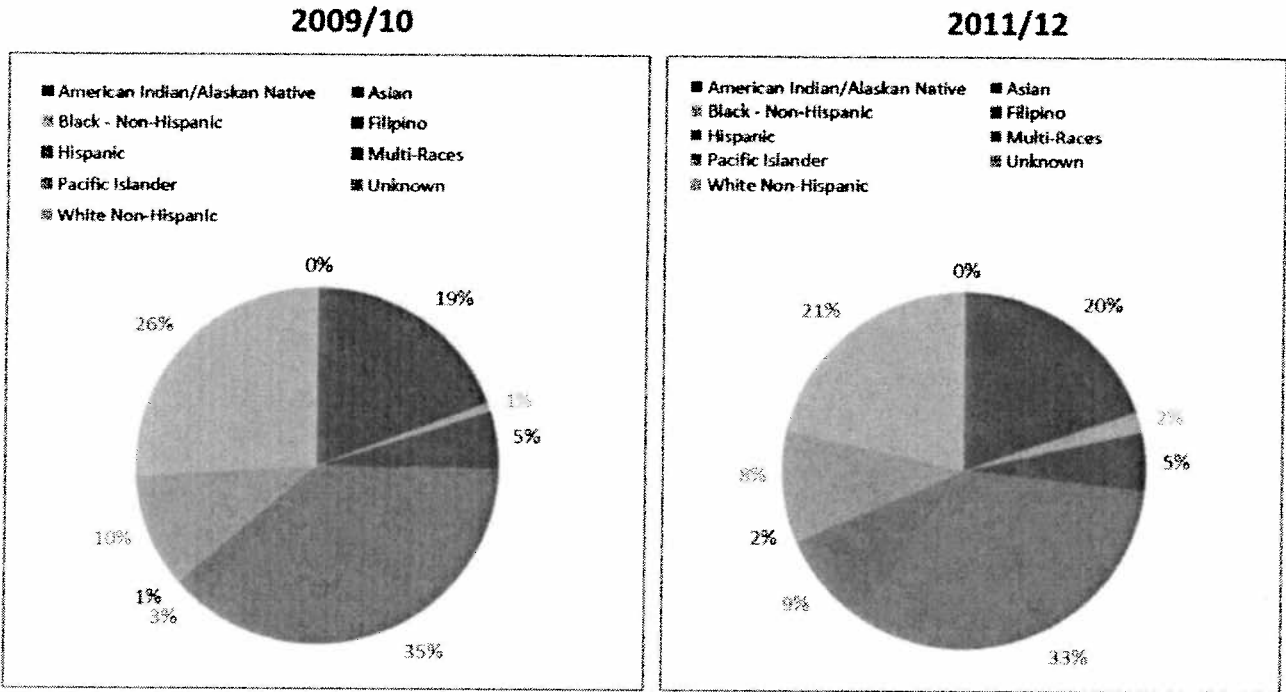
d. Student Demographics - Ethnicity

Metric	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Amer Ind/Alaskan Native		0%	0%	0%	0%
Asian		20%	19%	25%	20%
Black - Non-Hispanic		1%	1%	2%	2%
Filipino		3%	5%	5%	5%
Hispanic		30%	36%	31%	33%
Multi-Races		0%	3%	5%	9%
Pacific Islander		1%	1%	1%	2%
Unknown		11%	10%	11%	8%
White Non-Hispanic		34%	26%	21%	21%

The percent share of each ethnicity has relatively remained the same except for White/Non-Hispanic, which has been decreasing, and the Multi-Races, which has been increasing. When compared to the ethnic distribution for the entire College, the main difference the higher enrollment rates for Asians in the department (around 20%) versus around 8% for the entire College. The higher percentage of Asians in engineering courses maybe attributed to two factors. First, nationwide, Asian Americans study

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engineering at higher rates than other ethnicities. Second, since Skyline College does not offer any engineering courses, many of their students come to Cañada for their engineering courses, and Skyline's Asian student population is higher than Cañada's.



**B. Future Program Expectations**

Tools: San Mateo County's Largest Employers

<http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000081>

Staffing Patterns in Local Industries & Occupations

<http://www.labormarketinfo.edd.ca.gov/iomatrix/staffing-patterns1.asp>

Reflection: Describe how changes in business, community and employment needs, new technology, and new transfer requirements could affect the Program.

Demand for graduates with engineering and computer-related degrees are projected to continue to increase over the next several years. The development of AS-T degrees has the potential to increase the number of students completing their lower-division courses in community colleges before transferring to a four-year program. An AS-T degree in CIS at Cañada is being developed to articulate with the approved statewide AS-T degree. Statewide AS-T degrees in engineering are yet to be developed.



**COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS**  
**COMPUTER INFORMATION SYSTEMS PROGRAM LEVEL DATA**

a. Enrollment Patterns and Course Offerings – Computer Information Systems

Enrollment has been increasing steadily over the last five years, with headcount increasing, 46 in 2007-2008 AY to 165 in 2011-2012 AY. Class room attendance has steadily increased and doubled from 9.7 to 23.

<b>Metric</b>	<b>2007-2008</b>	<b>2008-2009</b>	<b>2009-2010</b>	<b>2010-2011</b>	<b>2011-2012</b>
Unique Headcount	46	49	115	103	165
Average Course Enrollment	9.7	18.7	13.6	22.3	23.0

To understand the cause of the increase from 2007-2012, the CIS course offering were modified in 2009 and has attracted additional students to the major. Among these students are students in the District who have not completed the official pre-requisite courses, as well as non-District students who may have completed the courses equivalent to the required pre-requisites but had difficulty signing for Cañada courses because of the extra step needed to have their courses validated. Future classes will have the prerequisite removed, to attract working adults who have the experience, but are blocked to easy access to signing up the course. This is particularly important for online students who could not readily come to campus and work on having this extra step accomplished in person. Additionally, starting in the Fall 2013, all courses will have an online component to attract further those students.

b. Department Efficiency – Computer Information Systems

The table below summarizes the trend in the Computer Information Systems Department efficiency for the last five years. The WSCH increased steadily from 2007-08 to 2011-12. The FTE has varied due the number of course offering for that term.

<b>Metric</b>	<b>2007-2008</b>	<b>2008-2009</b>	<b>2009-2010</b>	<b>2010-2011</b>	<b>2011-2012</b>
WSCH	365	369	742	647	1017
FTE	1	0.6	1.7	1.1	1.7
Load	367	614	426	607	610

The general trend of increasing student contact hours for from 2007 to 2012 is due to the realignment of the course offering and attracting more students. The decrease of load in 2009-2010 is dependent on the variation of the FTE even though the WSCH has increased.

c. Student Performance Profile – Computer Information Systems

<b>Metric</b>	<b>2007-2008</b>	<b>2008-2009</b>	<b>2009-2010</b>	<b>2010-2011</b>	<b>2011-2012</b>
Success Rate	59.09%	60.0%	49.0%	57.0%	44.0%
Retention Rate	78.0%	64.8%	68.5%	72.0%	64.8%



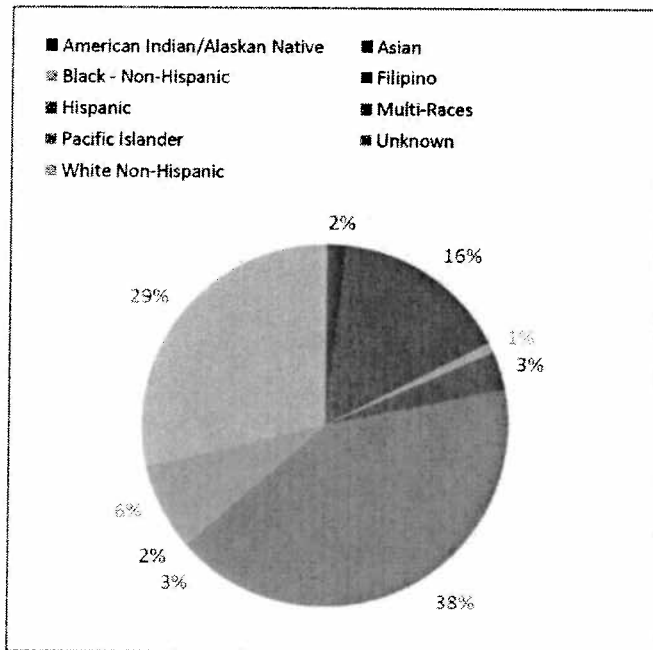
### COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

The Computer Information Systems Department's Student Performance Profile has varied. The success rate average is 50% for the last five years. This shows a need for further program reorganization, which is currently in process and should be approved by the Curriculum Review Committee March 2013. Additionally, by making all material for all CIS courses online, the success and retention rates for all are expected to increase.

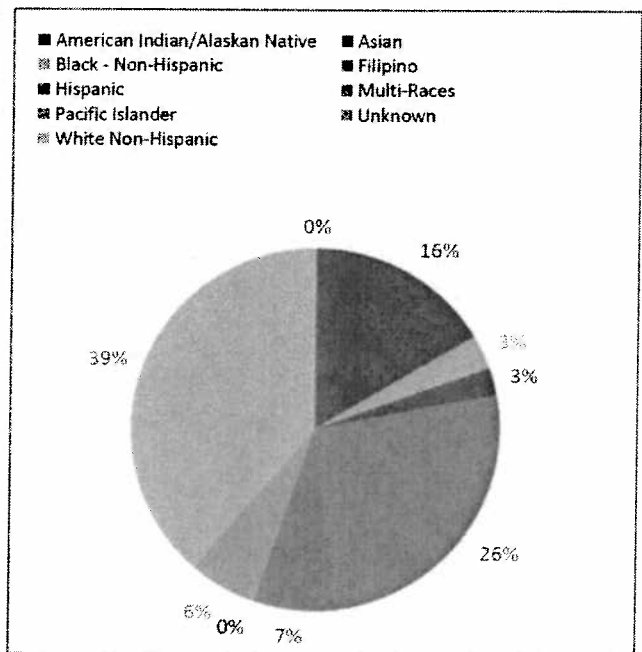
#### d. Student Demographics – Ethnicity – Computer Information Systems

Metric	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Amer Ind/Alaskan Native		0%	2%	0%	0%
Asian		7%	18%	16%	27%
Black - Non-Hispanic		0%	1%	2%	3%
Filipino		2%	3%	1%	2%
Hispanic		37%	38%	31%	26%
Multi-Races		0%	3%	7%	7%
Pacific Islander		0%	2%	0%	0%
Unknown		16%	6%	5%	6%
White Non-Hispanic		31%	29%	39%	39%

2009/10



2011/12



The percent share of each ethnicity has relatively remained the same except for Unknown, which has been decreasing, which is assumed due to better reporting on race. When compared to the ethnic distribution for the entire College, the main reason for the higher enrollment rates for Hispanics in the



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department (around 30%) is due to the high enrollment for the entire College. A second demographic is the higher percentage of Asians in CIS courses maybe attributed to the fact that, nationwide, Asian Americans study CIS at higher rates than other ethnicities.

### B. Future Program Expectations

Tools: San Mateo County's Largest Employers

<http://www.labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000081>

Staffing Patterns in Local Industries & Occupations

<http://www.labormarketinfo.edd.ca.gov/iomatrix/staffing-patterns1.asp>

Reflection: Describe how changes in business, community and employment needs, new technology, and new transfer requirements could affect the Program.

Demand for graduates with Computer Information Systems and computer-related degrees are projected to continue to increase over the next several years. The development of AS-T degrees has the potential to significantly increase the number of students completing their lower-division courses in community colleges before transferring to a four-year program. An AS-T degree in CIS at Cañada is being developed to articulate with the approved statewide AS-T degree. Statewide AS-T degrees in Computer Science has already been developed, and the proposal for new courses and degrees and certificates has been developed and presented to the Curriculum Committee.

### 6. Action Plan -

**Provide your action plan based on the analysis and reflections provided in the previous sections.**

Actions:

- Identify next steps to be taken and timelines.
- Identify questions that will serve as a focus of inquiry for the next year.
  - Determine the assessments; set the timeline for tabulating the data and analyzing results.
  - Describe what you expect to learn from the assessment efforts.

The Engineering Department has been collecting data on the number of students transferring to a four-year institution. Since spring 2008, this number has been increasing, and has more than doubled over the last five years. This is a reflection of the increasing enrollment in the engineering courses and the improving retention and success rates.

Year	Number of Engineering Transfers
2008	12
2009	18
2010	22
2011	28
2012	28



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A trend that needs to be addressed is the increase in the number of students in lab courses (Engr 100, Engr 210, Engr 270 and Engr 261). If enrollments in these lab courses continue to increase, there might be a need to offer more than one section of the lab.

The department will continue to pursue outside grants to fund curriculum improvement and other programs needed to support the increasing needs of the students. The table below summarizes the grants are currently active. A grant proposal developed with the RP Group and the Lawrence Hall of Science under the NSF STEP Program is currently pending. Future grant applications planned include: August 2013 for the NSF S-STEM (to renew the current NSF S-STEM grant that expires January 2014); May 2013 for the NSF TUES to continue developing online courses (especially online labs); October 2013 for the NSF LSAMP to develop a research internship program for STEM students; and October 2013 for the NSF ATE to expand the curriculum and develop new programs in CIS.

Grant	Funding Source	Time Frame	Total Grant
CALSTEP	Department of Education HSI STEM	10/1/2011-9/30/2016	\$5,959,147
VEAP B2E	State of California	08/1/2011-03/31/2012	\$224,813
NASA COMETS	NASA	10/1/2010-09/30/2013	\$450,000
ONE-STEP	National Science Foundation	10/1/2011-09/30/2013	\$165,000
PAESMEM	National Science Foundation	12/15/2011-11/30/2013	\$25,000
HIB Orange County	Department of Labor	11/1/2011-10/30/2013	\$67,5723
NSF S-STEM	NSF	02/01/2009-01/31/2014	\$605,250
SOLES	Department of Education - MSEIP	10/01/08-09/30//12	\$900,000

### 7. Resource Identification

#### A. Faculty and Staff hiring requests

Actions:

- Explain how hiring requests will serve the Program/Division/College needs
- Use supporting data.

None.



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**B. Professional Development needs**

- Actions:
- List the professional development activities the faculty and staff participated in this year.
  - Explain how professional development activities in the past six years have improved student learning outcomes.
  - Describe professional development plans for next year.

Training on Surveying Equipment use and SolidWorks, and perhaps AutoCAD for Civil (Land Development Desktop). Training for the surveying equipment is needed to support the new course, Engr 111. Currently, the course is being taught by an adjunct faculty. If the course becomes a permanent part of the department offering, the engineering full-time faculty needs to be trained on using the equipment. SolidWorks and AutoCAD continue to be upgraded every year, and faculty needs professional development in keeping up with the changes. Adjunct faculty in engineering will also need to be trained in online instruction to continue to support online courses.

**C. Instructional Equipment requests**

- Actions:
- List instructional equipment requests (include item description, suggested vendor, number of items, and total cost).
  - Explain how it will serve the Program/Division/College needs.

Item #	Item Description	Qty	Unit Cost	Tax & Shipping	Total Cost
1	AutoCAD Subscription Renewal	32	\$140	350	\$4,830
2	SolidWorks Subscription Renewal 30 User Network	1	\$1500	130	\$1630
3	NetSupport School Renewal	100	\$8	0	\$800
4	New i7 Workstations – 23’ monitors -Smart classroom needed Building 22 room 118.	32	950	0	\$24,000
5	Desks for Smart class room	16	300	0	\$4,800

AutoCAD, SolidWorks, and NetSupport School need to be kept current. If maintenance contracts are not current, upgrading them at a later time would be more costly.

**D. Facilities requests**

- Actions:
- List facilities requests (include custodial, repairs, maintenance, new building/lab/classroom, utility needs)
  - Explain how the requests will serve the Program/Division/College needs.



## COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS

- Change floor-mounted power plugs to ceiling-mounted ones. The current setup is prone to plugs breaking, and is also a hazard (students tripping on cords and outlets).
- The College needs a better Testing facility/proctoring services for online students. With the number of online students continually increasing, the Testing Service provided by the Learning Center is not sufficient for the following reasons:
  - Space is limited and is not able to accommodate more 20-25 students. This semester, the two online courses in engineering have more than 20 students each (close to 40 for Circuits).
  - Set up is not ideal.
    - The proctor is also working in the front desk, and hence cannot closely monitor the students taking tests. As a result it is very easy for students to cheat.
    - Time limits on tests are impossible to enforce since students do not take the test at the same time.
    - Noise level is too high and students complain about not being able to concentrate
  - To avoid the problems mentioned above the engineering faculty has been proctoring tests for online students. Often, more than one session has to be held because of scheduling conflicts. Sometimes, it is also difficult to find a room available for online students taking the test.
- Remodel Building 22 room 118 into a Smart Classroom for New AS/T degree and Certificates in “Computer Science” and all its Courses (with computer purchase)
  - Remove old computers, and desks...
  - Paint walls, and clean rug !
  - Install 16 double desks for computers, install 32 new workstations (i7, 17 inch monitors).

### E. Office of Planning, Research & Student Success requests

**Actions:**

- List data requests for the Office of Planning, Research & Student Success.
- Explain how the requests will serve the Program/Division/College needs.

We would like to get some data on student course-taking patterns across the District (and neighboring colleges). What percentage of students are taking courses in more than one College: Who are these students? What are the reasons for taking courses at different institutions? Success and retention of these students compared to those taking courses only at Cañada.

A cohort analysis of all incoming students. Success and retention rates/two-year retention rate/transfer rate correlated with initial placement, ethnicity, gender, declared major, high school, etc.





**COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS  
EXECUTIVE SUMMARY  
TO BE SUBMITTED TO THE SMCCCD BOARD OF TRUSTEES  
(2 page maximum)**

**Program Title:** Engineering and CIS

**Program Vision and Mission**

Cañada College's Engineering and Computer Science programs are transfer programs that offer the lower-division courses needed by students to transfer to four-year computer science programs or engineering programs in any field of engineering. The mission of the two programs is to educate students from a diverse population to become productive members of the engineering/computer science professions and society at large. Each department combines excellence in teaching theoretical principles and concepts with practical hands-on experience and the development of technical proficiency and communications skills. The departments work closely with the College's Mathematics, Physics, and Chemistry departments, as well as the College's Student Services Division and four-year engineering and computer science programs to maximize students' opportunity for timely completion of courses and successful transfer. Although primarily transfer programs, courses are also available for students who are seeking to update job skills related to engineering and computer science. Engineering and computer science students receive academic support services and professional development opportunities from the College's STEM Center (including the MESA Program).

The Computer Science Program also aims to provide MODERN facilities for the teaching of Computer Science courses, and to provide for an up to date curriculum, that meets the AS/T course requirements.

**Program Strengths**

The Engineering Program is one of the strongest transfer programs in the Science and Technology Division, and consistently has the highest number of students successfully transferring to a four-year institution. Over the last several years, the program has been successful in securing federal grant funds to improve student academic preparation through programs like Math Jam and Physics Jam, develop programs such as the Summer Engineering Institute and STEM Institute to increase student interest in STEM careers, enhance student success through tutoring and other academic support services, provide financial support through the NSF S-STEM scholarship program, and provide professional development opportunities through internships and professional conferences. In order to keep the curriculum current, the Engineering Department works closely with other community colleges through the Joint Engineering Program developed by Cañada through the HSI STEM grant, as well as four-year engineering programs through the California Engineering Liaison Council. All lecture courses are offered simultaneously as online courses, giving students flexibility in their schedules, and allowing students from other institutions to take the courses. Course offerings are coordinated



## **COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS**

with CSM's Engineering Department to provide maximum opportunity for students in the District to complete their transfer requirements in a timely manner.

The CIS program was revised in 2009 which has increased enrollment. However, the program needed further revision. The CIS degree will change to Computer Science AS degree, and be modeled after the AS/T courses, along with 3 new certificates in CS.

### **Program Challenges**

The increasing diversification of the lower-division engineering courses required for transfer continues to be one of the major challenges of the Engineering Program. Different universities and different engineering departments require different engineering courses for transfer. As a result, it has become increasingly more difficult for community college engineering programs to support all the courses needed by students transferring to different institutions in different majors. For example, a few universities (UC Berkeley, UCLA and Cal Poly) now have a course in Strength of Materials as one of their lower-division transfer requirements for mechanical and civil engineering students. Cañada's Engineering Department should explore the viability of offering this course to ensure that students transferring to these universities are well prepared.

Another major challenge for all California community college engineering programs is the development of a statewide AS degree for transfer. Currently, two Transfer Model Curriculum (TMC) patterns for engineering are being developed - one for Electrical/Computer Engineering, and one for Aerospace/Civil/Mechanical Engineering. The most difficult aspect in developing these TMCs is staying within the 60-unit limit.

The CIS program is in the process of reorganizing the degree and the courses to correspond to the Computer Science AS/T model. This is expected to draw increased interest and enrollment.

### **Action Plan Summary**

The action plan for the Engineering Department:

- Continue pursuing resources through federal grants: August 2013 - NSF S-STEM for scholarships; May 2013 - NSF TUES to develop online labs; October 2013 - NSF LSAMP; and October 2013 - NSF ATE for new CIS programs.
- Study the viability of offering Strength of Materials.
- Continue working with Arizona State University, and pursue similar partnerships with four-year engineering programs outside California.
- Continue working with Articulation Officer to keep articulation agreements current.

The action plan for the Computer Science Department is to:

- Change the CIS degree to a Computer Science Degree, and add CS Certificates.
- Update the courses offerings for the CS degree.
- Remodel Building 22, room 118 into a MODERN smart classroom to increase the interest and enrollment



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**COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS  
EVALUATION OF THE PROCESS**

To improve the Comprehensive Program Review and Analysis process your help and suggestions are instrumental. We ask that all parties responsible for preparation of this review have input into the evaluation. After completion of this process, please take a few moments to complete and return this evaluation to the chair of the Curriculum Committee.

**Program Title:** Engineering and CIS

Estimate the total number of hours to complete your Program Review. 6 hours

1. Was the time frame for completion of the Comprehensive Program Review and Analysis adequate? If not, explain.

Yes

2. Was the instrument clear and understandable? Was it easy to use? If not, explain and offer suggestions for improvement.

Yes

3. Were the questions relevant? If not, please explain and offer specific suggestions.

Yes

4. Did you find the Comprehensive Program Review and Analysis process to have value? If not, please explain and offer suggestions.

Yes

5. Was the data you received from administration complete and presented in a clear format? Would you like additional data?

Course taking patters of students attending more than one institution. What percentage of students are taking courses in more than one College: Who are these students? What are the reasons for taking courses at different institutions? Success and retention of these students compared to those taking courses only at Cañada.

A cohort analysis of all incoming students. Success and retention rates/two-year retention and transfer rates correlated with initial placement, ethnicity, gender, major, high school, etc.

6. Please offer any comments that could improve and/or streamline Comprehensive Program Review and Analysis process.

None



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**COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS  
CHECKLIST**

- All Annual Program Plans since the last Comprehensive Program Review process
- Completed Executive Summary page
- Completed Evaluation of the Process page
- Additional data

**Program Title:** Engineering and CIS **Date Submitted:** April 5, 2013

**Review Committee Chair** Amelito Enriquez

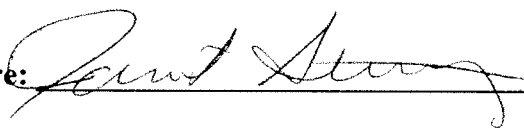
**Review Committee Members** Bill Schwarz, Kamran Eftekhari

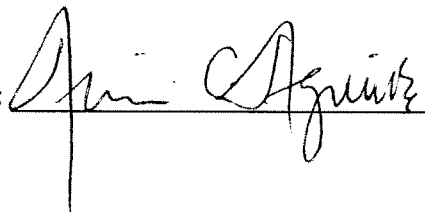


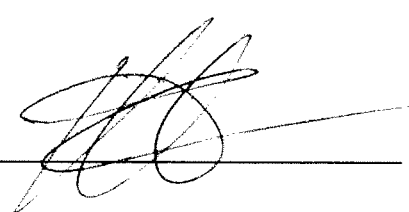
**COMPREHENSIVE PROGRAM REVIEW AND ANALYSIS  
INSTITUTIONAL RESPONSE SHEET**

**Program Title:** Engineering and CIS

Thank you for your time and effort in preparing this Comprehensive Program Review and Analysis. Your Executive Summary, with recommendations, will be forwarded to the College Planning Council.

**1. Division Dean Signature:**  **Date:** 4/26/13  
Comments:

**2. Curriculum Committee Chair:**  **Date:** 4/26/13  
Comments:

**3. College Vice President:**  **Date:** 4/26/13  
Comments:



**Comprehensive Program Review Feedback Form – Curriculum Committee**

**Program** Engineering and CIS **Division** Science & Technology

**Curriculum Committee** **Date**  
**Member(s) Reviewers** Kurt Devlin **Reviewed** 5/15/13

**The purpose of this form is to provide feedback to the Department/Program.**

<b>I. Program Learning Outcomes Assessment Cycle (PLOs)</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Reviewed 5-year data and identified changes that occurred in the program as a result of PLO assessment cycle.	5 year cycle has not yet been completed	Click here to enter text.	Click here to enter text.	Click here to enter text.
2. Explained how the assessment plan for PLOs measured quality and success of each program.	Click here to enter text.	Click here to enter text.	Data entered and results explained.	Click here to enter text.
3. Summarized assessment results of PLOs.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
4. Described and summarized other data that reveals program performance.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
Comments/Questions: E –portfolios are now required using Google Sites.				

<b>II. Curriculum offerings and Student Learning Outcomes Assessment Cycle (SLOs)</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Provided TracDAT and CurricUNET data in the appendix.	Click here to enter text.	Click here to enter text.	Completed	Click here to enter text.



### Comprehensive Program Review Feedback Form – Curriculum Committee

2. Identified patterns of curriculum offerings.	Click here to enter text.	Click here to enter text.	Fall and Spring courses presented.	Click here to enter text.
3. Reviewed the 2-year curriculum cycle of course offerings to ensure timely completion of certificates and degrees.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
4. Identified strengths of the curriculum.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
5. Identified issues and possible solutions.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
6. Identified plans for future curricular development and/or program modification.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes.
<b>Comments/Questions:</b> Engineering students are taking courses at Skyline and CSM and presents difficulty in tracking them.				

III. Program Level Data	Incomplete information	Complete information, some analysis	Complete information, analysis	Complete information, analysis, plan
1. Reviewed 5-year data to describe trends in student success, retention, demographics.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Completed
2. Analyzed trends and discussed plans to address significant findings.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes
3. Identified changes in business, community and employment needs, new technology, and new transfer requirements could affect the Program.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes – strong supporting data.
<b>Comments/Questions:</b> Both Programs have seen steady increases in student enrollment and market trends show an increased demand for workers in these fields. Engineering is working with other community colleges and four-year institutions to keep current with engineering trends. CIS has developed 3 new certificates: CS C++, CS JAVA and CS Objective C.				

**Comprehensive Program Review Feedback Form – Curriculum Committee**

<b>IV. Action Plan</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Identified reflections on Department/ Program needs and goals.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
2. Identified an action plan as a focus of inquiry for the next year.	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
<b>Comments/Questions:</b> Development of AS – T degrees will help students completed lower division courses before transferring. The biggest issue is not going over the 60 unit limit. If enrollment continues to increase, more lab sections may be offered.				

<b>Va. Faculty and Staff hiring needs</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Justification is consistent with accurate data and fits Department/Division/College needs.	None given	Click here to enter text.	Click here to enter text.	Click here to enter text.
<b>Comments/Questions:</b> Seems like a small Department that is growing. Could there be plans on hiring more staff in the near future if increases in enrollment continue?				

<b>Vb. Professional Development needs</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Identified professional development activities that faculty and staff participated in the past 6 years and	X	Click here to enter text.	Click here to enter text.	Click here to enter text.
2. Identified how professional development improved student learning outcomes (SLOs).	X	Click here to enter text.	Click here to enter text.	Click here to enter text.
3. Identified professional development plans for next years.	X	Click here to enter text.	Click here to enter text.	Click here to enter text.
4. Justification is consistent with Department/Program needs.	X	Click here to enter text.	Click here to enter text.	Click here to enter text.



**Comprehensive Program Review Feedback Form – Curriculum Committee**

Comments/Questions:  
 As a member of the Professional Development Committee, I know Professor Enriquez attends many seminars and conferences on a yearly basis.

<b>Vc. Classroom and Instructional Equipment needs</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Completed source/cost information (item description, suggested vendor, number of items, total cost).	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes
2. Justification is consistent with Department/Division/College needs.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes

Comments/Questions:  
 Click here to enter text.

<b>Vd. Office of Planning, Research &amp; Student Success data needs</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Justification is consistent with Department/Division/College needs.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes

Comments/Questions:  
 Good questions asked concerning student course-taking patterns across the District and neighboring colleges.

<b>Ve. Facility needs</b>	<b>Incomplete information</b>	<b>Complete information, some analysis</b>	<b>Complete information, analysis</b>	<b>Complete information, analysis, plan</b>
1. Justification is consistent with Department/Division/College needs.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes

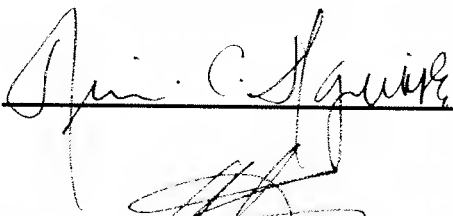
Comments/Questions:  
 Click here to enter text.

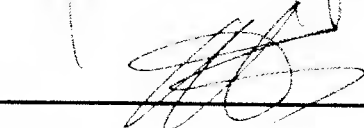


**Comprehensive Program Review Feedback Form – Curriculum Committee**

VI. Executive Summary	Incomplete information	Complete information, some analysis	Complete information, analysis	Complete information, analysis, plan
1. Identified program vision and mission	Click here to enter text.	Click here to enter text.	Yes	Click here to enter text.
2. Identified program strengths.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Good analysis
3. Identified program challenges.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Good analysis
4. Identified action plan summary	Click here to enter text.	Click here to enter text.	Click here to enter text.	Yes
Comments/Questions: Good analysis of current state of the program.				

**Other/General Comments:**  
 Professor Enriquez has built the Engineering Program into one of the top programs in the state. He has brought in large sums of money through grants to aid in curriculum improvement and other program needs. Professor Schwartz has updated curriculum for the CIS program and developed 3 certificates this past semester to help the Department keep current with the ever changing technology trends. Both professors gave a strong presentation to the Curriculum Committee regarding their Department.

Curriculum Committee Chair Signature  Date 5/17/13

VPI Signature  Date 5/20/13