Engineering/CIS
Request for Full-Time Faculty
Recommended for 2014-15

Part A

1. **Identify current Comprehensive Program and current Annual Program documents with position need and justification in the annual plan.**

    The 2013-14 program review document did not request a new full-time position. The position being requested is for BOTH computer science and engineering. Need in both areas was documented in the program review, but we did not anticipate the enrollment growth in CIS, or the additional grants awarded in engineering, resulting in more release time for Amelito Enriquez. These factors together with the inability to find adjuncts in CIS has resulted in this request for a new position at this time.

2. **Identify specialized knowledge (area expertise) or training needed for the discipline/program.**

    The minimum qualifications for engineering is a master's degree in **any** field of engineering. The lower-division engineering courses cover topics in at least six major fields of engineering. Table 1 shows the engineering courses currently offered at Cañada College, and the corresponding major fields of engineering expertise that cover these courses. Because of the wide variety of engineering courses, it is very difficult to find a candidate that has the experience and expertise to teach and develop curriculum for all these areas. It would be advantageous if the new full-time engineering faculty is hired to learn those courses that are outside their field of expertise before Amelito retires.

    A candidate who has the minimum qualifications for engineering and has either a bachelor's or master's degree in either computer science, or computer engineering is also qualified to teach CIS.

    Table 1. Summary of Cañada engineering courses and the relevant field of expertise.

Course Number	Title	Engineering Field
ENGR 100	Intro to Engineering	Any field
ENGR 111	Surveying	Civil
ENGR 210	Engineering Graphics	Civil; Mechanical
ENGR 215	MATLAB	Computer; Electrical; Mechanical
ENGR 230	Statics	Civil; Mechanical
ENGR 240	Dynamics	Mechanical
ENGR 260/261	Circuits	Computer; Electrical
ENGR 270	Materials Science	Chemical; Materials

    The computer science curriculum at Cañada has recently been updated. Cañada is one of the very first community colleges in the Bay Area to have an approved AS-T degree in computer science. Table 2 on the next page is a summary of the courses that are included in the current computer science curriculum. Six of the nine CIS courses are currently being offered, with CIS 242 offered for the first time this semester. Because of significant growths in enrollment (see Part C of this document), it is anticipated that all of these CIS courses will be available to allow students to take all the courses they need to complete their AS-T degree in computer science. As a result, an additional CIS faculty will be needed to develop and teach these courses. It should be noted that **finding qualified adjunct faculty to teach CIS courses has been extremely difficult** because of the low compensation for community college adjunct faculty when compared to what they can be making in industry as programmers. To a lesser extent, this difficulty in finding qualified adjunct faculty is also true for engineering.

Table 2. Summary of Cañada CIS courses and the status of current and future course offerings.

Course Number	Title	Status
CIS 118	Intro. to Computer Science	Currently offered
CIS 242	Comp. Arch. and Assembly Language	Currently offered
CIS 250	Intro. Object Oriented Programming: C++	Currently offered
CIS 252	Intro. to Data Structures - C++	Currently offered
CIS 284	Intro. to Object Oriented Programming - Java	Currently offered
CIS 321	iOS Programming	Currently offered
CIS 262	Discrete Mathematics for Computer Science	Starts Spring 2015
CIS 286	Introduction to Data Structures - Java	Starts Fall 2015
CIS 294	Intro to Obj. Oriented Program.: Objective-C	Starts Fall 2015

3. **Identify extraordinary program development and/or needs (for example: laboratory oversight, industry connections, student mentoring, etc.).**

Recent developments in the Engineering and Computer Science programs at Cañada have precipitated the need for a new full-time position. First, the increased involvement of engineering faculty member Amelito Enriquez in grant-funded programs will significantly reduce the amount of teaching that he will be able to do. Additionally, the recent approval of Cañada's CIS AS-T degree will result in an increase in the CIS course offerings to allow students to complete this degree. Furthermore, it is expected that the statewide AS-T degree for Engineering will be approved before the end of the current academic year, which will require the revision of Cañada's engineering curriculum.

Table 3 summarizes the active federal grants that are currently being coordinated by Amelito. Four of these grant programs are new for this academic year. Combined with previously existing grants, 80% of Amelito's load will be covered by these grants starting spring 2015 until he retires at the end of spring 2017. Because of the need to cover the majority of the engineering courses coupled with the need to develop and implement new CIS courses for the newly approved CIS AS-T degree, hiring a new full-time faculty in Engineering/CIS becomes critical to the continued success of the programs. As noted above, finding qualified adjunct faculty in CIS (and engineering to a less extent) can be very difficult because these individuals are in high demand in the local area and hence could be making more money working as programmers and engineers.

Table 3. Active federal grants coordinated by the Engineering Department

Grant Program	Funding Agency	Amount	Duration
S-STEM (M-SETS)	NSF	$655,249	2/15/09-12/31/14
HSI STEM	Dept of Education	$5,959,145	10/01/11-9/30/17[a]
REE	NSF	$63,919	6/01/14-5/31/17
S-STEM (ASPIRES)	NSF	$607,677	9/01/14-8/31/19
Engineering Articulation	NSF	$49,999	9/01/14-8/31/15
IUSE	NSF	$710,877	10/01/14-9/30/17

[a] Includes one-year no-cost extension

Table 4 on the next page is a summary of the FTEF trends for Engineering and CIS for the past several semesters. Except for the spring 2013 CIS FTEF, the percentage of FTEF that is taught by full-time faculty has been less than 70% for CIS, and less than 50% for engineering in most semesters.

Table 4. Summary of FTEFs for Engineering and CIS

Term	ENGR			CIS		
	FTEF ALL	FT-FTEF	%FT-FTEF	FTEF ALL	FT-FTEF	%FT-FTEF
Fall 2012	1.21	0.57	47%	0.80	0.20	25%
Spring 2013	1.15	0.40	35%	1.12	1.12	100%
Fall 2013	1.21	0.57	47%	1.70	1.10	65%
Spring 2014	1.15	0.53	46%	1.52	0.92	61%
Fall 2014	0.9	0.57	63%	1.90	1.20	63%

Table 5 shows the projected FTEFs for ENGR and CIS for spring 2015 to spring 2017, the next five semesters immediately preceding Amelito's retirement. Note that without a new full-time faculty, the overall percentage of FTEF covered by full-time faculty will be 30% during fall semesters, and 39% in spring semesters, which are significantly lower than what is mandated by law.

Table 5. Projected FTEF for ENGR and CIS for the next 5 semesters.

Term	ENGR FTEF	CIS FTEF	Total FTEF	FT-FTEF[b]	%FT-FTEF
Spring 15	1.15	1.92	3.07	1.20	**39%**
Fall 15	1.28[c]	2.68	3.96	1.20	**30%**
Spring 16	1.15	1.92	3.07	1.20	**39%**
Fall 16	1.28	2.68	3.96	1.20	**30%**
Spring 17	1.15	1.92	3.07	1.20	**39%**

[b] Assumes no overload for FT faculty.
[c] Includes Materials Science changing from 3 units to 4 units as proposed in the AS-T degree.

4. **Describe any future needs for the discipline/program.**

   The College's Engineering and Computer Science departments need to more closely collaborate with industry and four-year universities in order to address future needs and challenges. With the College's AS-T degree in computer science – the first one in the Bay Area to be approved – there is a need to offer new CIS courses to support the successful completion of the degree for the increasing number of computer science students in the College. Furthermore, the statewide AS-T degree in engineering is expected to be approved soon, and changes to the existing curriculum will have to be implemented.

5. **Describe any future economic, community, or government initiatives/mandates this proposal is addressing.**

   Strengthening the College's Engineering and Computer Science departments is in direct support of the Federal Science, Technology and Mathematics Education 5-Year Strategic Plan[1], and the recommendations of the President's Council of Advisors on Science and Technology (PCAST) to produce one million additional STEM professionals in the next decade in order for the US to retain its historical preeminence in science and technology[2]. In response the these White House initiatives, the

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[1] National Science and Technology Council, Committee on STEM Education, (2013). *Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan.*
http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf
[2] President's Council of Advisors on Science and Technology (PCAST), (2012). *Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics.*
http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final_2-25-12.pdf

National Science Foundation is launching a new program *Revolutionizing Engineering Departments (RED)* to enable engineering and computer science departments to achieve significant sustainable changes necessary to improve engineering education.[3] As indicated by the PCAST report, addressing the retention problem in the first two years of college is the most promising and cost-effective strategy to address this need. At the state level, the state engineering education community has been working to develop an AS-T degree for engineering in order to facilitate the transfer of engineering students. It is expected that this AS-T degree will be in place by the end of the current academic year.

6. Describe any budgetary implications of the proposal.

With 80% of the salary for Amelito Enriquez being covered by grants, the College can potentially save over $36k per year on salaries depending on the initial salary placement of the new full-time faculty.

Part B.

1. How is the request in line with the goals of the strategic plan?

The requested full-time position in two of the strongest and fastest-growing transfer programs in the College is in alignment with the College Strategic Direction of "Teaching and Learning" and "Completion" by equipping students with the knowledge and providing the resources they need to reach their educational goals. Moreover, a new full-time faculty in Engineering/CIS who has recent industry experience will be able to provide leadership towards the College's third Strategic Direction of "Community Connections" by building and strengthening collaborative relationships and partnerships with local industry, especially in the areas of technology and innovation.

2. What unmet needs will this position address (student, district, community)?

The full-time faculty member will provide the expertise and leadership needed to work with local industry and our 4-yr partner institutions to update the curriculum in engineering and CIS in response to rapid changes in technology fields. Additionally, filling this position will allow the Computer Science Department to offer all the courses needed for the newly approved AS-T degree in computer science, and the Engineering Department to revise the current curriculum at Cañada to be compatible with the new statewide AS-T degree in engineering that is currently being developed.

3. How will this position enhance retention or produce college-wide growth?

This new full-time position will be involved in developing new curriculum and enhancing existing ones to enhance the retention and success of students in the programs. Completing the hiring process before Amelito retires will also allow the new full-time faculty to gain experience (through Amelito's mentorship) in pursuing external grant funding to secure resources to promote college-wide growth. The instructional strategies and program initiatives being developed through the current NSF grants to improve teaching and learning will be piloted in the courses that will be taught by this new hire.

4. **Describe how the position supports a pathway to student educational goal completion (certificates and/or degrees) or GE transfer certification?**

This new full-time faculty will be involved in addressing needed curriculum changes in order to increase the number of computer science and engineering students who complete the AS-T degrees and transfer to four-year universities.

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[3] National Science Foundation, (2013). *IUSE/Professional Formation of Engineers: Revolutionizing Engineering Departments (RED)*. http://www.nsf.gov/pubs/2014/nsf14602/nsf14602.htm

Part C.

Discuss department/discipline/program enrollment trends the proposal addresses.

The Engineering Program is one of the strongest transfer programs in the College. Figure 1 shows the growth of the program over the last several years. From 2008 to 2010, engineering enrollment grew by 88%. Since then, the growth has slowed down partly because the department enrollment is nearing its capacity.

Engineering Enrollment
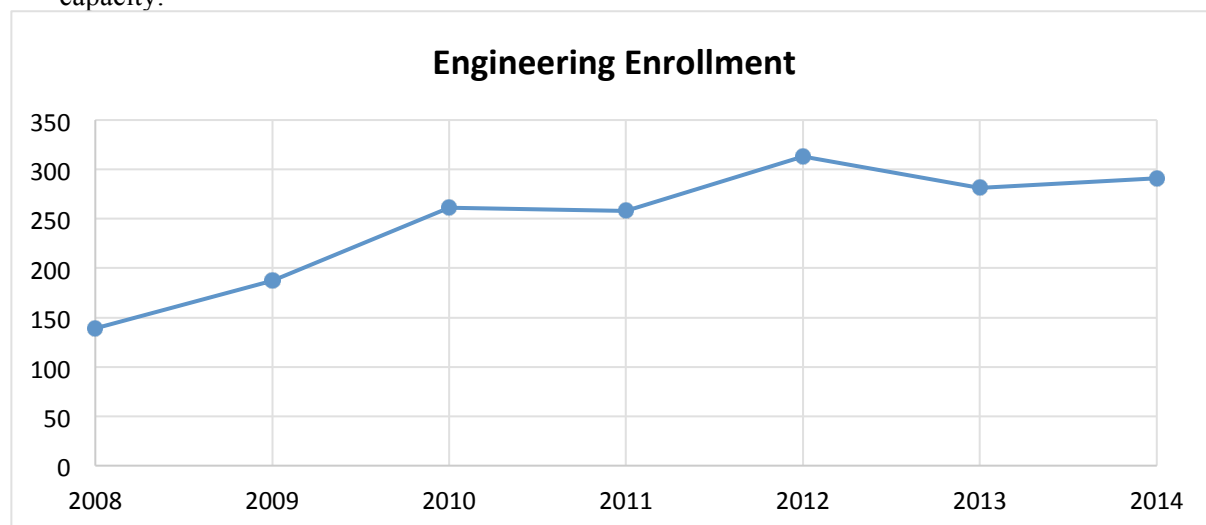
Figure 1. Total enrollments in engineering courses from 2008 to 2014. Note that the data for 2012 include a cohort of 15 student veterans each taking two engineering courses as part of the Veterans' Employment-Related Assistance Program (VEAP) grant.

The Engineering Department is also one of the most efficient departments in the entire college. Table 6 shows the Engineering Department LOAD compared with the overall LOAD for the College and each of the instructional divisions. For fall 2014, Engineering has the highest LOAD among all of the 43 departments in the three divisions, with a LOAD of 684, which 40% higher than the College overall LOAD of 489. This high load for the department indicates that enrollment is approaching its maximum capacity. For instance this semester, ENGR 210 has 33 students enrolled despite having a maximum capacity of 28 (as limited by the number of computers in the lab). ENGR 270 has 32 students in a lab class that is designed for 24 students. For spring 2014, the Engineering Department LOAD was the second highest among all the departments in the three divisions. The Oceanography Department, which is a smaller department with only three sections, had the highest LOAD for the semester.

Table 6. Engineering Department LOAD for fall 2014 and spring 2014 compared to average LOADs for the College, and the three instructional divisions.

|	Fall 2014	Spring 2014
Engineering Department	684[d]	582[e]
Cañada College	489	478
Science & Tech Division	539	495
Business Division	454	400
Humanities Division	440	405

[d] Highest department LOAD among all departments in the three instructional divisions.
[e] Second highest LOAD among all departments in the three instructional divisions. Oceanography (which is a much smaller department with only three sections offered) had the highest LOAD.

The dramatic increase in enrollments in CIS in the last couple of years is shown in Figure 2. Since fall 2012, CIS enrollment has increased by almost 200%. The increase in the number of students taking transfer-level CIS courses as shown in Figure 3 is even more dramatic. Over the past two years, the CIS program has gone from offering only one section of one transfer-level CIS course (CIS 250) every spring semester to several CIS courses needed for the AS-T degree. It is anticipated that the department will be able to support all the courses needed by students to complete their AS-T degree in computer science. This will be difficult to achieve without additional support from a new full-time faculty.
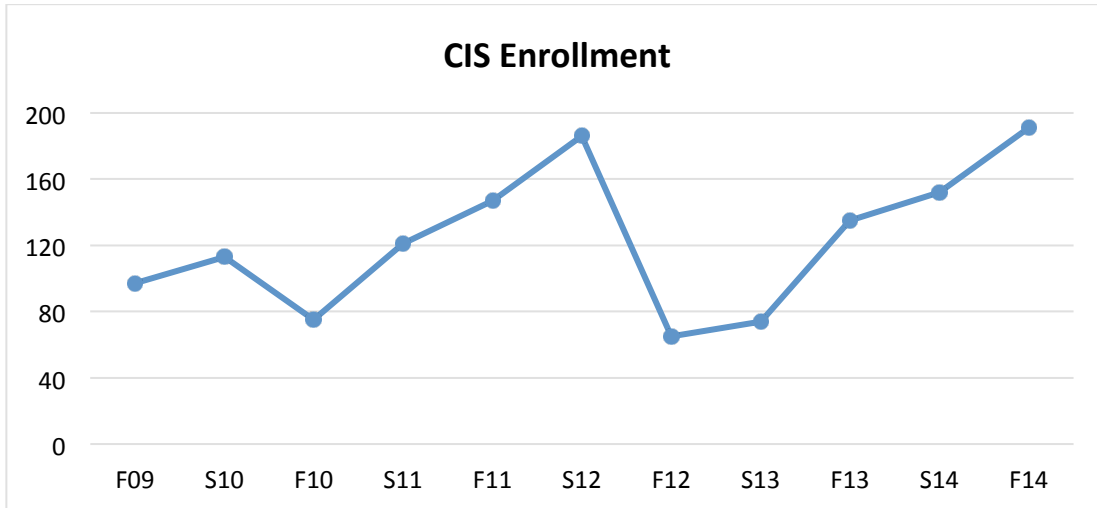
Figure 2. Total enrollments in CIS courses from fall 2009 to fall 2014.
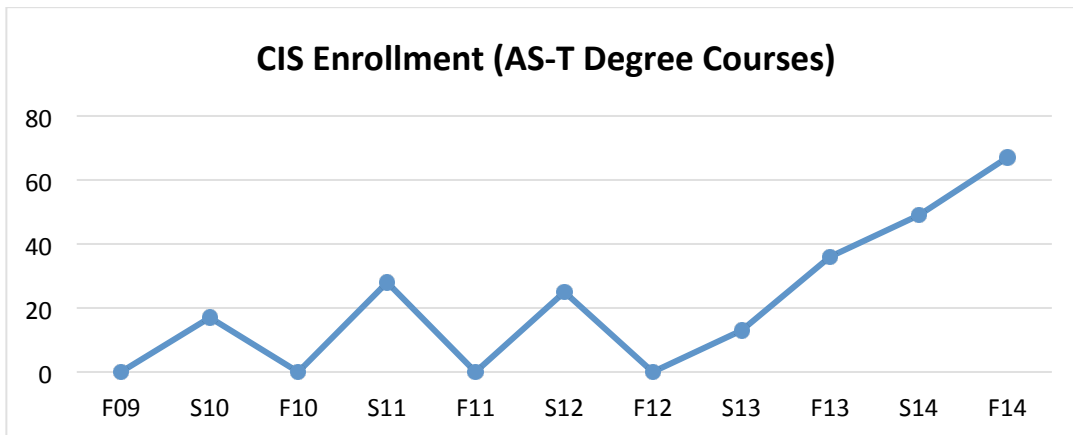
Figure 3. Total enrollments in CIS AS-T-degree-applicable courses from fall 2009 to fall 2014.