

# Santa Rosa Junior College

## Program Resource Planning Process

### Engineering 2015

#### 1.1a Mission

##### **Engineering & Applied Technology Department Mission:**

The mission of the Engineering & Applied Technology Department at Santa Rosa Junior College is to provide our students educational opportunities to meet their educational and professional development goals related to engineering and technology. We prepare them for transfer and employment by developing both their theoretical understanding and the technical, practical, and professional skills essential to their success. The faculty and staff strive to maintain strong linkages to the companies and professions that hire our graduates and play a pivotal role in supporting and guiding our programs.

##### **Engineering Transfer Program Mission:**

- To provide the academic and professional training for students pursuing engineering careers through course offerings and a robust range of engineering support activities and services.
- To improve the technological literacy in our general population and the awareness of the essential role engineering plays in our society and economy.

#### 1.1b Mission Alignment

##### **Engineering Transfer Program Only**

The Engineering Transfer Program aligns directly with the district's central educational mission. The program's lower division academic coursework and support services build the knowledge and skills of our engineering transfer students. Although not an occupational program, the Engineering Transfer Program also plays an important role in our community's economic development and global competitiveness because of the pivotal role engineers play in those arenas. SRJC is the only academic institution in Sonoma County delivering the complete spectrum of lower division engineering coursework and thus has a crucial role to play in meeting the engineering needs of our community.

## 1.1c Description

### **Engineering Transfer Program Only**

The Engineering Transfer Program provides the standard core of lower division engineering courses to prepare students to transfer to four-year universities and complete an engineering bachelor's degree. The program also offers an AS degree in Engineering. We are one of the largest and most respected engineering programs in the state, with about 240 engineering students on campus. About 60 engineering students transfer each year, making engineering the largest group of transfer students in STEM. Engineers comprise more than a quarter of the ~200 transfers in STEM majors. Our students are in demand by the top engineering schools and are extremely successful at those institutions.

In addition to developing math, science and engineering concepts and applying them to the world in which we live, the engineering courses develop analytical thinking, problem solving, visualization, design, and laboratory skills. The program has strong linkages with local engineering industry partners who have paid for classes, provided guest speakers and field trips, supplied internship opportunities, and built an engineering endowment.

## 1.1d Hours of Office Operation and Service by Location

### **Engineering Transfer Program Only**

#### **Santa Rosa :**

The engineering classes and labs are typically offered Mondays through Fridays in the Spring and Fall semesters during daytime hours on the Santa Rosa Campus. Each summer, we offer a section of Engr 10 (Intro to Engineering).

Since the reduction of the service center staff position to 75%, the program's service center is not open during all the normal work hours, especially as the service center must also serve the evening classes of the Applied Technology areas.

#### **Petaluma :**

Engr 10 (Intro to the Engineering Profession) is being offered on the Petaluma Campus in the Fall and Spring.

## 1.2 Program/Unit Context and Environmental Scan

### **Project Based Instruction**

An exciting trend in engineering education is the move to more project based learning. This is also an essential instructional mode for the CTE programs in our department. Currently, the department lacks the light fabrication/maker space facility necessary for project based instruction and skill development. Such a facility is a requirement to begin

the proposed new Mechatronics Technician program, to improve the Elect-Mech Maintenance Technician program, and to boost the project based instruction in our engineering courses. The engineering curriculum is already in place (Engr 770, Engr 12, Engr 101, Engr 102, Engr 103 draft) awaiting the necessary fab-lab environment. The makerspace would also be used for student projects for Engr 49 (including MESA poster projects), the robotics club, and the engineering club (TEC) and other engineering classes (Engr 45 & Engr 25 have project components). This facility would also serve as a fieldtrip destination for high school groups including MESA high school programs. The ideal location for this Fab-Lab would be in 1447 & 1448, an underutilized lab space and adjoining unused office/storage space. This facility would require SLIA staffing, to be shared between all the of Engineering and Applied Technology programs. Most of the required equipment already existed in storage within electronics, engineering, applied technology, and trade technology.

### **High School Student & Industry Demand for Engineering**

Student demand for engineering and technology continues to grow. The engineering education pipeline is full at every level with students eager for the training that leads to a rewarding career. Nationally and locally, the job market for engineers remains stronger than for any other discipline. Locally, Medtronic is hiring, Agilent is hiring, JDSU is hiring... To meet their engineering needs, companies hire foreign engineers using the H1-B visa system (currently 59,400 per year).

### **Engineering as a Priority**

Engineering education is a national priority as demonstrated by President Obama's Educate to Innovate campaign. At the state level, California's Labor and Workforce Development Agency (LWDA) forecasts that we will need 20,000 to 24,000 additional engineers to be educated in California to meet the growing engineering needs of both the private and public sectors over the next decade. Engineering education is also a priority with our local community. Recently, the Sonoma County business community formed BEST (Building Economic Success Together) to support and attract innovative businesses that will create high-quality jobs for the future. Agilent Technologies is a key player in BEST and they are spearheading an engineering education focused initiative to try and increase the size of the local engineering education pipeline. Agilent and the Sonoma State have requested an expansion of the SRJC engineering pipeline to feed SSU's Electrical Engineering program. Four times over the past 6 years, local engineering companies and groups (American Council of Engineering Companies, Winzler & Kelly, Agilent, and O'Reilly Publishing) have stepped in to pay for important engineering courses when they were cut. The external environment for engineering has never been brighter. Locally, the expansion of our engineering program is hamstrung by the lack of **LAB SUPPORT**. We have cancelled classes these past two Fall semesters because of inadequate staffing. This Fall's offerings were again reduced because of the lack of lab support staff.

### **Engineering TMC Major**

Statewide efforts to develop the TMC for various engineering majors are progressing in spite of its high unit issues. At SRJC, the Engineering Transfer Program has most of the pieces in place to transition to AS-T majors if that comes to pass. SRJC's Engineering Transfer Program is a partner in the JEP Grant (Joint Engineering Project) and is directly involved in the state-wide engineering coordination efforts. The lead faculty member is currently serving as the Community College Segment Chair for the Engineering Liaison Council that coordinates the statewide engineering curriculum efforts.

## **Technological Literacy**

An important trend in engineering education is the move to foster technological literacy of our society through the development of general education courses related to engineering. If the program's lab support crisis can be stabilized, the program hopes to expand in this area by offering the approved Engr 12 How Stuff Works course and developing the Engr 14 America's Technological Infrastructure course.

### 2.1a Budget Needs

#### **Engineering Transfer Program Only**

Engineering has no budget augmentation requests at this time. The budget needs for Applied Technology will be supplied in a different PRPP.

### 2.1b Budget Requests

Rank	Location	SP	M	Amount	Brief Rationale
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### 2.2a Current Classified Positions

Position	Hr/Wk	Mo/Yr	Job Duties
Lab Assistant	40.00	10.00	Manage the two CAD labs 1799 & 1751.
Admin Assistant	30.00	12.00	Manage the Bussman Service Center. Support the 10 programs & 40+ faculty of the Engineering & Applied Technology Department

### 2.2b Current Management/Confidential Positions

Position	Hr/Wk	Mo/Yr	Job Duties
Department Chair	20.00	10.00	Manage the 10 programs and 40+ faculty of the Engineering & Applied Technology Department.

### 2.2c Current STNC/Student Worker Positions

Position	Hr/Wk	Mo/Yr	Job Duties
Engineering SLIA	8.00	10.00	Support Materials Lab 1767 (Engr 45 & Mach 60A), Support Engr 16 offerings in Electronics Lab 1452. Support Engr 101 & 102 classes (1767 & 1784). Help clear out decades of outdated/broken equipment in electronics areas.
Electronics Student Assistant	10.00	10.00	Support Electronics Programs in 1447 and 1452. Help clear out decades of outdated/unused/broken equipment in electronics areas.

### 2.2d Adequacy and Effectiveness of Staffing

#### **Engineering & Applied Technology Department Lab Support**

The Engineering & Applied Technology Department is requesting a full time, 11 month SLIA Lab Technician to support the laboratory facilities and technology needs of the department's students. This critical position consolidates the lab staffing support requests that are in the department's many PRPPs. It replaces the cuts to engineering & electronics staff support over the past 10 years and puts an end to the inefficient scramble for support that our programs go through each semester. It is essential for our

department to continue to grow in engineering and retool in the CTE areas. This position is required for the proposed Mechatronics Technician program.

Lab facilities to be supported by this requested SLIA:

Electronics Lab (1452)

Fabrication Lab (1447 & 1448)

Materials Lab (1767 & 1768)

Survey Equipment Room (1799E)

Engineering and Applied Technology houses nearly a dozen technology intensive programs that require lab environments to meet their course and program Student Learning Outcomes. Technology intensive labs require lab staff support.

The department currently relies on an inadequate hodge-podge of STNC and student helpers to run 3 of the 5 lab facilities used by the department (Materials Lab 1767/68, Electronics Labs 1452 and 1447/48). Other classes and programs have no lab support at all including: Survey Tech, Water Waste Water Tech, and Solar PV. The department has scrambled using FWS students, CalWorks students, student volunteers, MESA funded students, a Teaching Fellows student, and most recently an emergency STNC SLIA and a student helper. In the lab environments, broken and uncalibrated equipment seriously degrades the learning environments for Engineering and Applied. The emergency plan for the Fall is a 25 hr/week STNC SLIA to be hired over the summer. The department cannot sustain it's labs with unstable support and constant hiring and training of part time, short term bandaids. The college is loosing out of FTES because we have been cancelling engineering classes the last two years including Engr 16 last Fall because of inadequate part-time temporary lab support. Expansion classes are on hold (Engr 12, 101, 102, 770) pending lab support.

The college has an opportunity to invigorate the engineering and technology area of STEM by making our labs open to these energetic hands-on students. Let's ramp up independent studies & MESA poster projects, student projects in The Engineer's Club and the Robotics Club, and class projects in engineering, electronics, architecture, civil tech... Engr 770 is through the curriculum process and ready to go to accrue apportionment for such activities. The SLIA will rotate through all the lab facilities so that students in all the programs can work on projects and the district will accrue the apportionment. MESA is also in favor of this position as it will allow MESA to use the facilities as well for high school MESA program outreach activities. Let's get these labs staffed, upgraded, and open; the energy and excitement will generate enrollment throughout the engineering and technology programs, and even the rest of STEM.

### **Engineering & Applied Technology Administrative Assistant**

The Engineering & Applied Technology Department is requesting an increase in our administrative assistants hours to 40 hours per week. The department is the most complicated on campus; almost a dozen different programs in both CTE and transfer areas, with few full time faculty and 40+ adjunct faculty members. The department runs classes at three different sites, Monday through Saturday, day and evening.

## 2.2e Classified, STNC, Management Staffing Requests

Rank	Location	SP	M	Current Title	Proposed Title	Type
0001	Santa Rosa	02	01		Science Lab Instructional Aide/Technician 40 hr	Classified
0002	Santa Rosa	02	01	STNC SLIA 8 hrs/wk + Student Assist 20 hrs/wk	STNC SLIA 25 hrs/wk	Classified
0003	Santa Rosa	02	01	Admin Assist 1, 75%	Admin Assist 1, 100%	Classified

## 2.3a Current Contract Faculty Positions

Position	Description
Engineering, 100%	Engineering transfer focus, qualified in physics & ap tech.
Engineering/Physics, 40%/60%	RETIRING THIS DECEMBER. Physics and materials focus, qualified in engineering & physics.
Applied Tech, 100%	RETIRING THIS DECEMBER. CAD focus, qualified in Ap Tech.
Architecture, 60%	RETIRING THIS MAY. Architecture and Construction Management focus, qualified in Ap Tech.
Civil Engineering Tech, 100%	EXPECTED NEW HIRE for Fall 2015, emphasis depends on qualifications of the person

### 2.3b Full-Time and Part-Time Ratios

Discipline	FTEF Reg	% Reg Load	FTEF Adj	% Adj Load	Description
Engr & Ap Tech	2.5200	26.3000	6.8500	71.6000	Spring 2015, 9.57 Total FTEF, 2.52 Reg, 0.20 OL, 6.85 Adj

## 2.3c Faculty Within Retirement Range

### **Engineering & Applied Technology Department**

With Ed Sikes retirement last December, the Engineering & Applied Technology Department is currently down to 3 FTEF faculty from its 2005-2010 baseline of 5.3. Only 26% of classes were taught by regular contract faculty in Spring 2015. Gary Pasqualetti and Younes Ataiyan are retiring in December, and Deborah Sweitzer is retiring in May. Vince Bertsch will be on sabbatical in the Spring. The department will bottom out at 1.6 full time faculty for next Spring (includes the Civil Engr Tech position currently being hired) with a FT% of about 14%.

## 2.3d Analysis of Faculty Staffing Needs and Rationale to Support Requests

### **Engineering & Applied Technology Department**

Without a replacement position next year, the Engineering & Applied Technology Department will be at 2.0 full time faculty and a FT% of about 17% for Fall 2016. With the Engineering Graphics Technology position requested below, the department would have 3.0 FTEF for Fall 2016 (approx 26% FT teaching). As we have seen this past year, even this higher level of full time staffing is not sufficient to update curriculum, assess SLO's, evaluate adjunct faculty, serve on hiring teams for faculty & staff, manage advisory groups, evaluate & update programs, purchase and repair equipment, mentor adjuncts, supervise staff...

The department has prioritized the following 3 positions:

### **Engineering Graphics Technology**

This position will anchor the CAD and Animation portions of our departments' offerings, replaces Gary Pasqualetti. This position covers 2.11 FTEF of load (Spring 2015) that will have no full time faculty support in Spring 2016.

### **Electrical Engineering Technology**

This position will anchor the Elect-Mech Maintenance Technician and Solar Photo-Voltaic programs as well as bring on board the proposed Mechatronics Technician program, replaces Ed Sikes. This position covers 1.83 FTEF of load (Spring 2015) that has had no full time faculty support since Fall 2014.

### **Materials Engineering**

This position will anchor the materials portion of the engineering transfer program and allow the expansion of the program to meet the growing demand in engineering. The position replaces Younes Ataiyan (40% engineering) who retires in December. The position rewards the 50% growth in engineering that is fueling expansion of physics and math offerings. Transfer Engineering currently offers 2.39 FTEF (Spring 2015) with plans to add Engr 16 this Fall. More expansion opportunities in engineering are on hold pending lab staff support and a facilities upgrade. If those augmentations go through, faculty staffing will become the long pole in the tent.





## 2.3e Faculty Staffing Requests

Rank	Location	SP	M	Discipline	SLO Assessment Rationale
0001	Santa Rosa	02	01	Engineering Graphics Technology	Essential for Engineering & Applied Technology to function as a department. Even with this position, the department will be down to two full time faculty for Fall 2016. There must be someone to anchor the applied technology CAD portion of our department.
0002	Santa Rosa	02	01	Electrical Engineering Technology	Essential for Engineering & Applied Technology to function as a department. Even with the Engr Graphics Tech position, the department will be down to three full time faculty for Fall 2016. There must be someone to anchor the electro-mechanical technician, solar photo-voltaic, and proposed mechatronics programs.
0003	Santa Rosa	02	01	Materials Engineering	There need to be someone to anchor the materials engineering portion of our program and meet the growth in demand for Engineering Transfer offerings.

## 2.4b Rational for Instructional and Non-Instructional Equipment, Technology, and Software

### **Engineering Transfer Program Only**

The Applied Technology requests are being handled in a different PRPP.

Pedestal style chairs in 1783 are dangerous in that they are extremely old, frequently break, and the bolts connecting them to the floor gradually loosen. The mini "stenographers" desks are completely inappropriate for technical disciplines which require textbooks, workbooks, and calculators to be used simultaneously.

Engineering's top priority is to expand it's project based learning opportunities for students. The next purchase in this category is a 3D scanner.

## 2.4c Instructional Equipment and Software Requests

Rank	Location	SP	M	Item Description	Qty	Cost Each	Total Cost	Requestor	Room/Space	Contact
0001	Santa Rosa	02	01	3D scanner	1	\$3,500.00	\$3,500.00	V. Bertsch	1799	V. Bertsch

## 2.4d Non-Instructional Equipment, Software, and Technology Requests

Rank	Location	SP	M	Item Description	Qty	Cost Each	Total Cost	Requestor	Room/Space	Contact
0001	Santa Rosa	02	01	Remodel 1783 for long tables	1	\$15,000.00	\$15,000.00	V. Bertsch	1783	V. Bertsch

## 2.5a Minor Facilities Requests

Rank	Location	SP	M	Time Frame	Building	Room Number	Est. Cost	Description
0001	Santa Rosa	02	01	Urgent	Bussman	1447 & 1448	\$55,000.00	Convert under utilized lab space into a "maker" space to reinvigorate electronics, energize our local industry partners, recruit for MESA and STEM, and advance engineering project based learning.
0002	Santa Rosa	02	01	Urgent	Shuhaw	1783	\$15,000.00	The existing chairs with mini desks don't meet student needs.

## 2.5b Analysis of Existing Facilities

### **Engineering & Applied Technology Department**

#### **Fab-Lab (1447 & 1448)**

The Engineering and Applied Technology Department proposes converting Bussman 1447 & 1448 into a Fab-Lab/Makerspace to modernize the electronics programs, expand project-based instruction in engineering, and offer a fabrication space for all the programs and clubs in our department. Makerspaces are springing up at universities and colleges as well as through community and industry groups. The Maker Movement is the grass roots effort to democratize design and manufacturing tools to unleash our creative potential in engineering and technology. Tapping this movement can help advance many of our shared STEM educational priorities, boosting STEM recruitment, K-12 and MESA connections, and expanding project-based instruction. The Fab-Lab would be used not only by electronics and engineering classes, but also by student groups like TEC, WISE and the Robotics Club, by other parts of the JC community like MESA and physics, and community activities like Day Under the Oaks, Expanding Your Horizons, and Pre-Mesa days. The Fab-Lab becomes a media focal point, demonstrating to the larger community SRJC's commitment to STEM education and triggering a surge in Foundation contributions.

#### **Curriculum & Instruction**

Much of the necessary curriculum is already in place. Engr 770 has made it through the curriculum process and is ready to capture apportionment when students log-in to use the facility. Engineering classes such as Engr 45 & 25 already have group project components. The project courses Engr 101 & Engr 102 have both been piloted and a third Engr 103 Microelectronic Projects is being developed this year. MESA has a vibrant research & design poster project program ready to expand, but for the lack of a facility the students can use for their projects. TEC club participation is at an all-time high with ambitious projects including outfitting bikes with electric motors and the solar regatta competition all being done in parents' garages. The Elect-Mech Maint Tech program has many lab classes and would benefit from expanding into project-based instructional modes. The proposed Mechatronics Tech program needs a facility with both the mechanical and electrical lab environments necessary to build those skills. The Architecture program will benefit from having a place to build their models.

#### **Equipment**

Much of the equipment needed for the Fab-Lab is already here. 1448 is currently cluttered with unused sheet-metal cutters, benders, and punches, and a pair of PC board routers. The department recently purchased a 3D printer and a laser cutter this year that both need a home. The wide range of hand tools needed for the Fab-Lab are readily available from overstock in Lounibus as well as from many community sources. And most importantly, a Fab-Lab is self-sustaining; it is a student centered facility where they learn the resourcefulness to be engineers and technicians. They find funding, they source materials, they build and/or purchase equipment as they need it.

#### **Facilities**

Bussman 1447 & 1448 are the most appropriate facility. Large enough to accommodate the needs of a modernized electronics lab that uses software based

testing equipment with interface devices, and also larger tables for flexible use by project groups. There is ample storage in the adjacent store room. 1448 has windows to allow for easy supervision by lab staff. 1448 will also be used for equipment that has a higher level of security/safety concerns.

### Timeline

The facility could be ready for use in Fall 2016. An important consideration will be accommodating the lab needs of the electronics programs while the retrofit is completed. After the Fab-Lab is operational, there will be two complementary facilities to meet the needs of the electronics programs as it evolves towards Mechatronics. Detailed planning and continued clearout of obsolete equipment during early Fall 2015, demolition of fixed benches starting early Spring 2016. Installation of new furniture in late Spring 2016, installation of equipment through Summer 2016.

### Stepping Stone Concept

This project is a pilot project or beta test for the integrated lab environments we will be designing into the new STEM building. That building will need the capabilities of an electronics lab, flexible fab-lab, light manufacturing, materials lab and we need the experience putting the fab-lab/light manufacturing into place. We also can't wait 7 years to incorporate project based instruction, expand engineering, and transition from electronics to mechatronics. An added benefit of this project is to facilitate flexible use during the Shuhaw Hall demolition and STEM building construction.

### **Chairs Needed (Rm 1783)**

The primary engineering lecture room (1783) is in desperate need of an upgrade to the 40+ year old chairs. Each semester, chairs break and are a danger to the students. Some have been removed and not replaced. The small & sloped "steno pad" size desks are totally inadequate for the engineering students who must use notebooks, textbooks and calculators all at the same time. Collaborative learning is an important element in all our classes and this is greatly hampered by the small fixed desks.

## 3.1 Develop Financial Resources

### **Engineering Transfer Program Only**

Engineering has a long history of bringing in local industry to financially support student enrichment, scholarships, and even pay to reinstate cut classes. Our strong engineering program has been and will be a selling point for garnering grant and bond resources.

## 3.2 Serve our Diverse Communities

### **Engineering & Applied Technology Department**

Engineering & technology serves our diverse student community. MESA has added extra support for SHPE, Society of Hispanic Professional Engineers. Human Resources guides our department regarding hiring diversity.









## 4.1b Program Student Learning Outcomes Assessment

### **Engineering Transfer Program Only**

Engineering Transfer Program SLO's are incorporated into the Engineering Major (Approved by state: 7/15/09). The program's SLO's align closely with ABET (Accrediting Board for Engineering and Technology) and university articulation requirements. Program SLO Assessment was completed in Summer 2011. Data was collected in Spring 2015 for a second Engineering Transfer Program SLO Assessment to be completed Summer 2015.

## 4.1c Student Learning Outcomes Reporting

Type	Name	Student Assessment Implemented	Assessment Results Analyzed	Change Implemented
Course	Engr 6 Matlab Programming	Spring 2014	Spring 2014	N/A
Course	Engr 10 Intro to Engineering	Spring 2014	Spring 2014	N/A
Course	Engr 16 Circuits and Devices	Spring 2014	Spring 2014	N/A
Course	Engr 25 Engineering Graphics	Fall 2013	Fall 2013	N/A
Course	Engr 34 Statics	Fall 2013	Fall 2013	N/A
Course	Engr 45 Engineering Materials	Fall 2013	Fall 2013	N/A
Course	Engr 49 Independent Study	Spring 2014	Spring 2014	N/A
Course	Engr 101 Design Project	Fall 2012	Fall 2012	N/A
Course	Engr 102 Robotics Project	Fall 2013	Fall 2013	N/A
Course	Engr 770 Suppl Instructr E&AT	N/A	N/A	N/A

## 4.2a Key Courses or Services that address Institutional Outcomes

Course/Service	1a	1b	1c	2a	2b	2c	2d	3a	3b	4a	4b	5	6a	6b	6c	7
Engineering Job Shadow Program				X				X	X							X
ENGR 10		X		X	X		X	X	X	X		X	X	X		X
ENGR 101	X	X		X				X	X	X	X	X				
ENGR 102	X	X		X				X	X	X	X	X				
ENGR 770		X			X		X			X		X				X
The Engineer's Club				X	X							X				X

## 4.2b Narrative (Optional)

## 5.0 Performance Measures

### **Engineering Transfer Program Only**

As a part of program SLO assessment, student feedback forms were collected the last week of the Spring 2015 semester in almost all of the sophomore engineering & physics classes. For next Fall (2015), there were 58 engineering transfers to 17 different universities in 10 majors. 18 to UC Davis, 7 to SJSU, 6 to Cal Poly SLO, 4 to UC Berkeley, 9 to other UC's, 11 to other CSU's. 21 Mechanical Engineering, 21 Electrical

& Computer Engineering, 6 Bio & Biomedical Engineering, 3 Civil Engineering, 7 others. These transferring engineering students will have completed an average of 97 units before transfer, with an average 3.36 GPA.

This is about a 50% increase in the size of the engineering transfer program over the past 5 years. Electrical and Computer Engineering interest has rebounded from the .com crash. Bio & Biomed Engineering is booming around the state, our growth has been modest and we have more growth opportunity here. Civil Engineering at SRJC has waned even though both job prospects and local industry support are excellent. I'm hopeful that our new department hire can make a difference in this area.

**Engineering Course Performance**

The engineering courses have had solid enrollment efficiency, average class sizes, retention, and student success over the past 15 years.

**5.1 Effective Class Schedule: Course Offerings, Times, Locations, and Delivery Modes (annual)**

**Engineering Transfer Program Only**

Engineering courses are scheduled in coordination with math and physics courses to allow students to progress efficiently through the sequence of courses required for engineering transfer.

The Engineering Transfer Program is successfully offering Engr 10 in Petaluma.

There are currently no plans to offer any online engineering courses. Other colleges and universities that have tried offering engineering courses online report tremendous faculty startup costs and significant challenges maintaining the quality of student course work to the rigorous standards required for engineering disciplines.

**5.2a Enrollment Efficiency**

**Engineering Transfer Program Only**

The Engineering Transfer Program's enrollment efficiency is very good. Petaluma's 72% efficiency is negatively impacting the Santa Rosa Campus' 95% efficiency.

Discipline	X2011	F2011	S2012	X2012	F2012	S2013	X2013	F2013	S2014
Engineering	0.0%	95.8%	100.0%	0.0%	88.9%	110.1%	80.6%	100.7%	97.1%

**5.2b Average Class Size**

**Engineering Transfer Program Only**

Average class sizes in engineering are solid. Many of our engineering classes are at or above capacity and fill very early in the registration process. Lab facilities limit most of our enrollments (Engr 25, 6, 45, and 16.)

Discipline	X2011	F2011	S2012	X2012	F2012	S2013	X2013	F2013	S2014
Engineering	0.0	23.0	24.0	0.0	21.3	26.4	29.0	24.2	22.5

### 5.3 Instructional Productivity

#### **Engineering Transfer Program Only**

The engineering offerings have solid enrollment. We only offer single sections of most of our classes so we have no flexibility in combining sections gain efficiency. Lab enrollments are limited by facilities and equipment.

#### FTES/FTEF Efficiency

Engineering		X2011	F2011	S2012	X2012	F2012	S2013	X2013	F2013	S2014
	FTEF	0.00	16.86	19.19	0.00	15.45	22.42	1.33	17.62	31.27
	FTEF	0.00	1.20	1.26	0.00	1.20	1.43	0.10	1.20	2.27
	Ratio	0.00	14.06	15.23	0.00	12.88	15.64	13.36	14.68	13.79

### 5.4 Curriculum Currency

#### **Engineering Transfer Program Only** **Curriculum Status**

Course	Version	Approved
Engr 6	3	10/17/11
Engr 10	4	4/13/15
Engr 16	4	4/13/15
Engr 25	5	2/24/14
Engr 34	5	2/24/14
Engr 45	4	10/27/14
Engr 49	3	10/26/09
Engr 101	2	2/22/14
Engr 102	2	2/17/14
Engr 770	1	4/27/15

The Engineering Transfer Program is up to date with its curriculum. Engr 49 will be due next year and is slated for submission in the Fall.

#### **Curriculum Plans**

1. Add Engr 103 Microelectronic Projects course (currently in draft form).
2. Adjust the engineering major to address the Lib 10 - Engr 10 situation.
3. Consider increasing units for Engr 10 to match state standards.
4. Submit AS-T majors in engineering when TMC is state approved.
5. Add Engr 26 as a Civil Engineering Graphics Course (similar to CEST)
6. Cross list surveying as an engineering course to improve articulation.

7. Add SLO's and reinstate Engr 12 when support for engineering improves.
8. Investigate bio and biomedical engineering course options.
9. Add GE course: Engr 14 America's Technological Infrastructure.

## 5.5 Successful Program Completion

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## 5.6 Student Success

### **Engineering Transfer Program Only**

Retention and completion rates for engineering are quite high for what are some of the most challenging lower division classes at any college (71-87%). Our retention statistics are significantly higher than at other institutions. We feel this is accomplished

primarily by the excellent quality of students we enjoy at SRJC because of both the college's and the program's excellent reputation, the superb preparation our students receive in all their STEM preparatory classes, and the esprit de corps developed in our program both in classes and extra curricular activities. GPA statistics have varied these past two semesters. Only Engr 10 is taught in the Summer and it commonly has a higher GPA. For Fall 2014, the primary full time faculty member was on sabbatical and the replacing adjuncts appear to have adopted a more lenient scale.

**5.6a Retention** The percentage of students receiving a grade of A,B,C,D,CR, or I in each Discipline (duplicated headcount).

Discipline	X2011	F2011	S2012	X2012	F2012	S2013	X2013	F2013	S2014
Engineering	0.0%	85.9%	80.6%	0.0%	75.6%	78.5%	77.8%	75.3%	80.0%

**5.6b Successful Course Completion** The percentage of students receiving a grade of A,B,C, or CR in each Discipline (duplicated headcount).

Discipline	X2011	F2011	S2012	X2012	F2012	S2013	X2013	F2013	S2014
Engineering	0.0%	83.7%	78.2%	0.0%	71.7%	73.1%	74.1%	71.2%	78.0%

**5.6c Grade Point Average** The average GPA in each Discipline (UnitsTotal / GradePoints).

Discipline	X2011	F2011	S2012	X2012	F2012	S2013	X2013	F2013	S2014
Engineering	0.00	3.15	2.79	0.00	2.81	2.53	3.09	2.76	2.90

## 5.7 Student Access

### Engineering Transfer Program Only

The gender statistics for the Engineering Transfer Program shown a gradual rebound from the disastrous merger that eliminated key support activities in engineering that were so essential and successful in improving the program's gender statistics.

Year	Engr - % of students who are women
07-08	18.7%
08-09	15.5%
09-10	21.7%
10-11	20.3%
11-12	10.0%
12-13	11.2%
13-14	11.9%
14-15	13.7%

The top critical restoration to the engineering program remains **LAB SUPPORT STAFF**. Second is to allocate resources using judgement on the needs of the programs, not a formulaic allocation of chair release time based on gerrymandering programs together.

**5.7a Students Served - by Ethnicity** The number of students in each Discipline at first census broken down by ethnicity (duplicated headcount).

Engineering	Ethnicity	2011-12	Percent	2012-13	Percent	2013-14	Percent	2014-15
	White	167	64.0%	166	61.7%	233	60.2%	
	Asian	6	2.3%	21	7.8%	32	8.3%	
	Black	1	0.4%	8	3.0%	3	0.8%	
	Hispanic	45	17.2%	35	13.0%	96	24.8%	
	Native American	2	0.8%	6	2.2%	2	0.5%	

	Pacific Islander	0	0.0%	0	0.0%	0	0.0%	
	Filipino	5	1.9%	9	3.3%	3	0.8%	
	Other Non-White	0	0.0%	0	0.0%	13	3.4%	
	Decline to state	35	13.4%	24	8.9%	5	1.3%	
	<b>ALL Ethnicities</b>	<b>261</b>	<b>100.0%</b>	<b>269</b>	<b>100.0%</b>	<b>387</b>	<b>100.0%</b>	

**5.7b Students Served - by Gender** The number of students in each Discipline at first census broken down by gender (duplicated headcount).

Engineering	Gender	2011-12	Percent	2012-13	Percent	2013-14	Percent	2014-15
	Male	231	88.5%	237	88.1%	339	87.6%	
	Female	26	10.0%	30	11.2%	46	11.9%	
	Unknown	4	1.5%	2	0.7%	2	0.5%	
	<b>ALL Genders</b>	<b>261</b>	<b>100.0%</b>	<b>269</b>	<b>100.0%</b>	<b>387</b>	<b>100.0%</b>	

## 5.8 Curriculum Offered Within Reasonable Time Frame

### Engineering Transfer Program Only

The Engineering Transfer Program has been trying to offer its core courses every semester. Engr 16 was cancelled last Fall because of inadequate lab staffing. Engr 45 will be cancelled next Spring if regular lab staffing is not in place. Other courses are not being offered because of inadequate lab staffing and facilities (Engr 12, 101, 102).

## 5.9a Curriculum Responsiveness

### Engineering Transfer Program Only

The Engineering Transfer Program oversees curriculum in many different areas: mechanical engineering, electrical engineering, civil engineering, material science, and even some computer science. Innovative curriculum in bio engineering, civil engineering graphics, and engineering for GE are on the back burner because of the crises of **NO LAB SUPPORT**. Bio and biomedical engineering has seen a tremendous surge across the state and the country. We currently have no orientation, recruitment, or curriculum in this area. Another potential growth area is Civil Engineering. The addition of a civil engineering graphics course (modeled on CEST 85) would boost enrollment and better serve students. The national trend to add general education classes to the engineering curriculum is another advance deserving of resources. The grant funded development of Engr 12, How Things Work was successfully in getting the class added to the list of GE science courses at SRJC. But offering the class was delayed by schedule cuts and is now on hold until resources are sufficient to offer the class.

## 5.9b Alignment with High Schools (Tech-Prep ONLY)

## 5.10 Alignment with Transfer Institutions (Transfer Majors ONLY)

### Engineering Transfer Program Only

The Engineering Transfer Program articulates well with the UC, CSU, and Private university engineering programs. We send students to universities all over the state and beyond. Each specific engineering field at each university has autonomy to set

their own transfer and graduation requirements. As a result, we do not meet all the requirements for all the university programs. It is a complicated decision whether to add a course to the offerings, especially when we are so limited in lab support and facilities. The faculty are very involved with state and national groups that address the challenges of engineering articulation and transfer including ELC (the Engineering Liaison Council) and ASEE (American Society for Engineering Education).

### 5.11a Labor Market Demand (Occupational Programs ONLY)

#### **Engineering Transfer Program Only**

The Engineering Transfer Program is not an occupational program, but labor market demand suggests the college invest more resources to strengthen and expand the program. The labor market for bachelor degreed engineers avoided the precipitous downturn that affected so many other job sectors and has already rebounded. Throughout the economic malaise, US companies continued to hire foreign engineers using the H1-B visa system at the maximum allowed 59,400 per year. Locally, even two years ago, Agilent, Medtronic, and JDSU were all hiring.

### 5.11b Academic Standards

#### **Engineering Transfer Program Only**

For the Engineering Transfer Program, a real concern has been the difficulty in maintaining quality in the face of dwindling resources and packed classes. Inadequate lab support forces students to triple or quadruple up on lab equipment. Lack of operable equipment and staff support is driving some curricular decisions.



## 6.1 Progress and Accomplishments Since Last Program/Unit Review

Rank	Location	SP	M	Goal	Objective	Time Frame	Progress to Date
0001	Santa Rosa	02	01	Lab Support for Engineering & Electronics Plus	SLIA Covering 1767, 1447, and 1452	Fall 2013	Classified Staffing
0002	Santa Rosa	04	01	Expand Project Based Learning Opportunities	Fab-Lab in 1447 & 1448	Fall 2014	Facilities Budget and/or Industry support
0003	Santa Rosa	02	01	Bring back the Agilent Robotics Challenge	Revive the Agilent & MESA partnerships	Fall 2013	Agilent grant, faculty time

## 6.2a Program/Unit Conclusions

Location	Program/Unit Conclusions
Santa Rosa	Engineering has enormous local industry support potential and untapped grant possibilities.
Santa Rosa	Engineering has excellent job markets and high student demand.
Santa Rosa	Engineering has many growth opportunities, especially in bio related engineering fields.
Santa Rosa	Engineering and electronics need a restoration of lab staffing to maintain, improve, and expand.
Santa Rosa	Engineering and the other ATEP programs need a department structure with improved efficiency and faculty coordination time based on their needs not a formula.
Santa Rosa	Engineering needs Younes' replacement to share in the tasks of engineering and support the materials engineering part of the curriculum.
Santa Rosa	Engineering, electronics and MESA could all benefit from a "Maker Space" in Bussman.

## 6.2b PRPP Editor Feedback - Optional

### 6.3a Annual Unit Plan

<b>Rank</b>	<b>Location</b>	<b>SP</b>	<b>M</b>	<b>Goal</b>	<b>Objective</b>	<b>Time Frame</b>	<b>Resources Required</b>
0001	Santa Rosa	02	01	Lab Support for Engineering & Electronics and more.	100% SLIA/Technician Covering 1767/68, 1447/48, and 1452	Fall 2015	Classified Staffing
0002	Santa Rosa	02	01	Expand Project Based Learning Opportunities	Fab-Lab/Maker Space in 1447 & 1448	Fall 2016	Facilities Budget and/or Industry support
0003	Santa Rosa	02	01	Bring back the Agilent Robotics Challenge	Revive the Agilent & MESA partnerships in Fall to add Engr 102 class for Spring 14	Spring 2017	Agilent grant, faculty time