Instructional Programs

2017-2018 Self-Study

Three-Year Program Review Template

Manufacturing

Technology and Engineering

Statement of Collaboration

The program faculty listed below collaborated in an open and forthright dialogue to prepare this Self Study. Statements included herein accurately reflect the conclusions and opinions by consensus of the program faculty involved in the self-study.

Participants in the Self-Study

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Authorization

After the document is complete, it must be signed by the Principal Author, the Department Coordinator, and the Dean prior to submission to the Program Review Committee.

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Printed name of Principal Author	Signature	Title	Date
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1.0 Mission and Goals

The College's Mission, Vision, Core Values and Goals drive all college activities. The Program Review committee would like to understand the connection of your program to the College's Mission, Vision, Core Values and Goals. Summarize how your program supports each area.

Mission:

The Fullerton Community College Manufacturing Program prepares students to achieve performance excellence in the manufacturing trades. This will be accomplished by teaching strong fundamental skills and making effective use of new and current technologies.

Evidence of this is as follows:

- Our student success rates in the private manufacturing industry are above all other private educational institutions and are offered at a fraction of the price of private institutions.
- Students in our departments come from all walks of life with ages ranging from 18 -70 years.
- Students and employers have come to our Manufacturing courses and program offerings in Drafting; Machining; Welding; and other Technology courses due to their intense technical nature.
- Our instructors in the Manufacturing area all have private industry backgrounds that exceed most college requirements and are in alignment with industry standards.
- We enable students to achieve the minimum requirements of the welding industry.
- The manufacturing program at Fullerton College provides flexible pathways for students who seek career growth, certificates, associates degrees and transfer through class offerings in high demand fields such as machining, drafting and welding.
- Day and evening class times are scheduled with both the new student and working adult in mind. The program fosters a supportive and inclusive environment for students through appropriate class sizes, individualized instructor attention, group projects, field trips and extensive networking opportunities with fellow students and local industry.
- Instructors maintain industry connections with in-demand job opportunities, and aid students in job placement and growth experiences.

Vision:

The manufacturing program seeks to create a student body that promotes inquiry and intellectual curiosity about all aspects of manufacturing, personal growth and a life-long appreciation for the power of learning. To create an atmosphere of continuous improvement of methods and processes that must be instilled in all future manufacturing personnel. Future trends in manufacturing will be identified and implemented into the manufacturing program with the assistance of vocational advisory committees.

Evidence of this is as follows:

- Advisory Committee meetings on a regular basis.
- Constant contact and an open door policy with surrounding business leaders regarding needs and job opportunities.
- A welcoming and encouraging environment to all students that would like to work in the manufacturing field.

- Constant involvement with Manufacturing Day; STEM; and Career Fair activities on and off campus.
- Instructors in the program (both full time and adjunct) are from the industry and understand the business of manufacturing. This knowledge is imparted to students.
- We believe that talent is created by great instruction and hard work.
- The manufacturing department provides skills necessary for a foundation of a solid manufacturing based education.
- The Manufacturing Technology program transforms lives and inspires positive change by imparting a passion for lifelong learning to students.
- The skills developed in machining, drafting and welding have allowed individuals to pursue high demand lucrative jobs all over the world.

Core Values:

- We respect and value the diversity of our entire community.
- We expect everyone to display behavior in accordance with personal integrity and high ethical standards.
- We value tradition and innovation.
- We support the involvement of all in the decision-making process.
- We expect everyone to continue growing and learning.
- We value and promote the well-being of our campus community.
- We believe in the power of the individual and the strength of the group.
- We accept our responsibility for the betterment of the world around us.

Evidence of this is as follows:

- Integrity: We believe trust and reliability are essential elements in a safe and effective learning environment hence we promote openness, honesty, respect, safety and fairness.
- Diversity: We recognize diversity, we value and support meaningful communication and inclusiveness in a collaborative decision-making processes.
- Accountability: We value students, faculty, and staff, hence we recognize their contributions, encourage their professional development, and regularly evaluate performance to improve learning outcomes, programs, and overall student achievement.
- Cooperation: We value collaboration and teamwork, hence we develop professional relationships among students, employees, teachers, and our community in an effort to expand partnerships.
- Excellence: We value continuous improvement, encourage innovation, creative problem-solving and responsible risk-taking as we deliberately and systematically work towards enhancing and enriching our learning environment and our community.
- Learning: We are committed to providing learning opportunities that enable individual and community achievement, are affordable for all members of our community and promote a culture of life-long learning.

College Goals:

Goal 1: Fullerton College will increase student success.

- Objective 1: Address the needs of under-prepared students.
- Objective 2: Increase course retention and success.

- Objective 3: Increase the number of degrees and certificates awarded.
- Objective 4: Increase the number of transfers.
- Objective 5: Increase the number of students participating in STEM activities.
- Objective 6: Increase the persistence rate of students.

Goal 2: Fullerton College will reduce the achievement gap.

- Objective 1: Address the needs of English language learners.
- Objective 2: Increase retention rate of Hispanic and African-American students by at least 2%.
- Objective 3: Increase success rate of Hispanic and African-American students by at least 2%.
- Objective 4: Increase persistence rate of Hispanic and African-American students by at least 2%.
- Objective 5: Increase the number of students from underrepresented groups participating in STEM activities.

Goal 3: Fullerton College will strengthen connections with the community.

- Objective 1: Strengthen our contacts with Alumni.
- Objective 2: Strengthen partnerships with local feeder high schools and universities.
- Objective 3: Strengthen partnerships with local business and industry.
- Objective 4: Increase funding capabilities of the college.
- Objective 5. Increase engagement of the college with the community through college events, community service, and other partnerships.

Evidence of this is as follows:

- Students have access to grants; scholarships; and other sources of funding through various financial aid departments at Fullerton Community College if they are qualified.
- This past year we have initiated at least 3 new certificates in the manufacturing area (Metrology Mini Certificate; Metrology Certificate; CNC Swiss Lathe Certificate) in Curricunet which are currently in the approval process and are due to be approved in Fall 2018. We have also revised a number of courses and programs in Welding and Drafting as part of our on-going 6 year Curriculum review process. Evidence of this are the 4 new welding classes and an Associate Degree in Welding Technology which are in various stages of approval in Curricunet.
- Starting in Fall 2018 all Machine Technology courses will be 100 level and above so that students who desire to transfer to a 4 year school will have courses that are transferable to CSU schools.
- We host a number of STEM; Manufacturing Day; Career Day; and Smart Start Saturday events every year and will continue to do this as part of the recruiting effort for local High Schools.
- There are no prerequisites to enter into our beginning courses thus we welcome all students regardless of their academic work record.
- We have started on a path of developing Collaborative Relationships with students who have graduated and who are in the program currently. Social media resources such as Email; Facebook; and industry links are being used to maintain relationships with students.
- All High Schools with an interest in Technology have been told they are welcome to tour our facilities at any time they wish and we have encouraged many High School CTE instructors to come by. In addition, we have been invited and attended on a regular basis many local High School Career day and similar events to present our programs and answer questions posed by prospective students. We have spoken to all counselors at Fullerton College to let them know of the manufacturing programs in the Technology and Engineering Division.
- We have started a job board in the machine shop lab where we post job opportunities from local businesses that are in need of personnel.

- We have reached out to Engineering and Science level students at the High Schools and the college to participate in our courses. We have created and posted advertisements throughout the campus to promote Manufacturing and individual programs/certificates associated with manufacturing.
- We have applied for and received Strong Workforce Funding in the past two years of over 400K for manufacturing programs.
- We hold yearly Advisory Meetings which are primarily made up of local businesses in the field to advise us on current needs and trends. There is also an open invitation to any member of the committee to come on site at any time to discuss needs.
- Student employability in industry is not limited to welding; machining; or drafting but also includes other manufacturing related fields such as field service, construction and fabrication.

Statement of Ethics:

As a representative of Fullerton College, we all share the responsibility to conduct ourselves with integrity, and to act in a fair, consistent, and equitable manner. We recognize the need for openness and reliability in what we say and do. We are committed to addressing issues in a forthright and professional manner, and to engage people without prejudice. As members of an educational community, we are committed to excellence in all that we do, and to adhere to the principals of ethical behavior established in this statement.

2.0 Program Data & Trends Analysis

2.1 Key Performance Indicators (KPI)

For each KPI listed below, analyze and report your findings and describe what they mean.
(Attach 5-year longitudinal data from Office of Institutional Research and Planning (OIRP) to Appendix.)

Table 1-KPI and Findings

KPI	Findings
Enrollment	Since the 2013, annual enrollment has grown from 1285 to 1468 in 2017, representing a 12.5% increase. (See Figure 1 and 2)
Total FTES	FTES Generation has grown since 2013 from 209.3 to 248.5 in 2017 which represents a 15.77 % increase. (See Figure 1)
Sections	Sections have had a steady increase every year. Sections have grown from 101 in 2013 to 117 in 2017. (See Figure 3)
FTEF	Total FTEP has grown from 16.7 in 2013 to 23.6 in 2017. (See Figure 4)
Fill Rate	The 5 year fill rate average is 106.8%. (See Figure 5)
WSCH/FTEF	WSCH per FTEF has declined from 382.0 in 2013 to 316.7 in 2017. (See Figure 4)
Retention	Retention rate has grown since 2013 from 87.0% to 88.7% in 2017. (See Figures 6)
Success	Success rate has grown since 2013 from 74.1% to 79.7% in 2017. (See Figures 7)

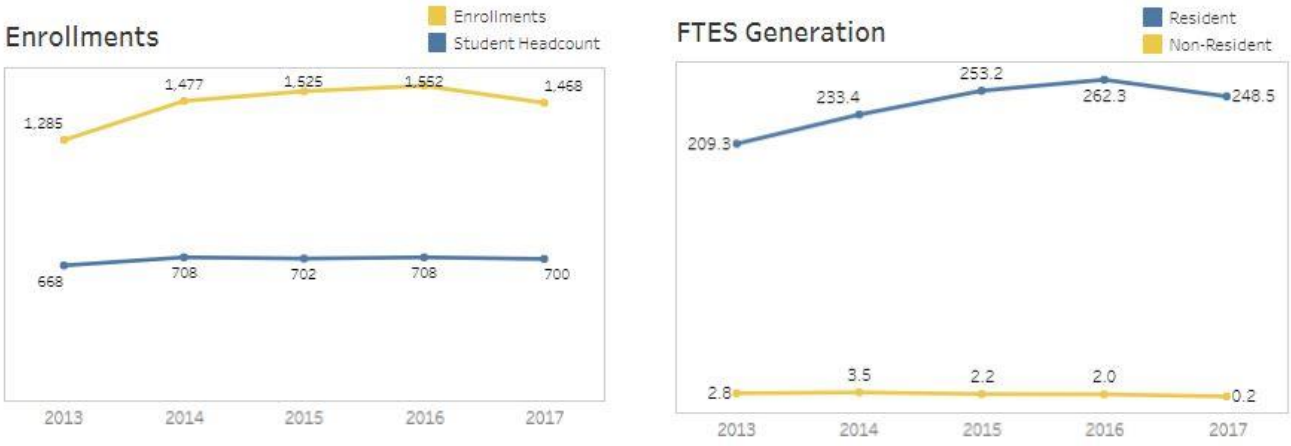


Figure 1

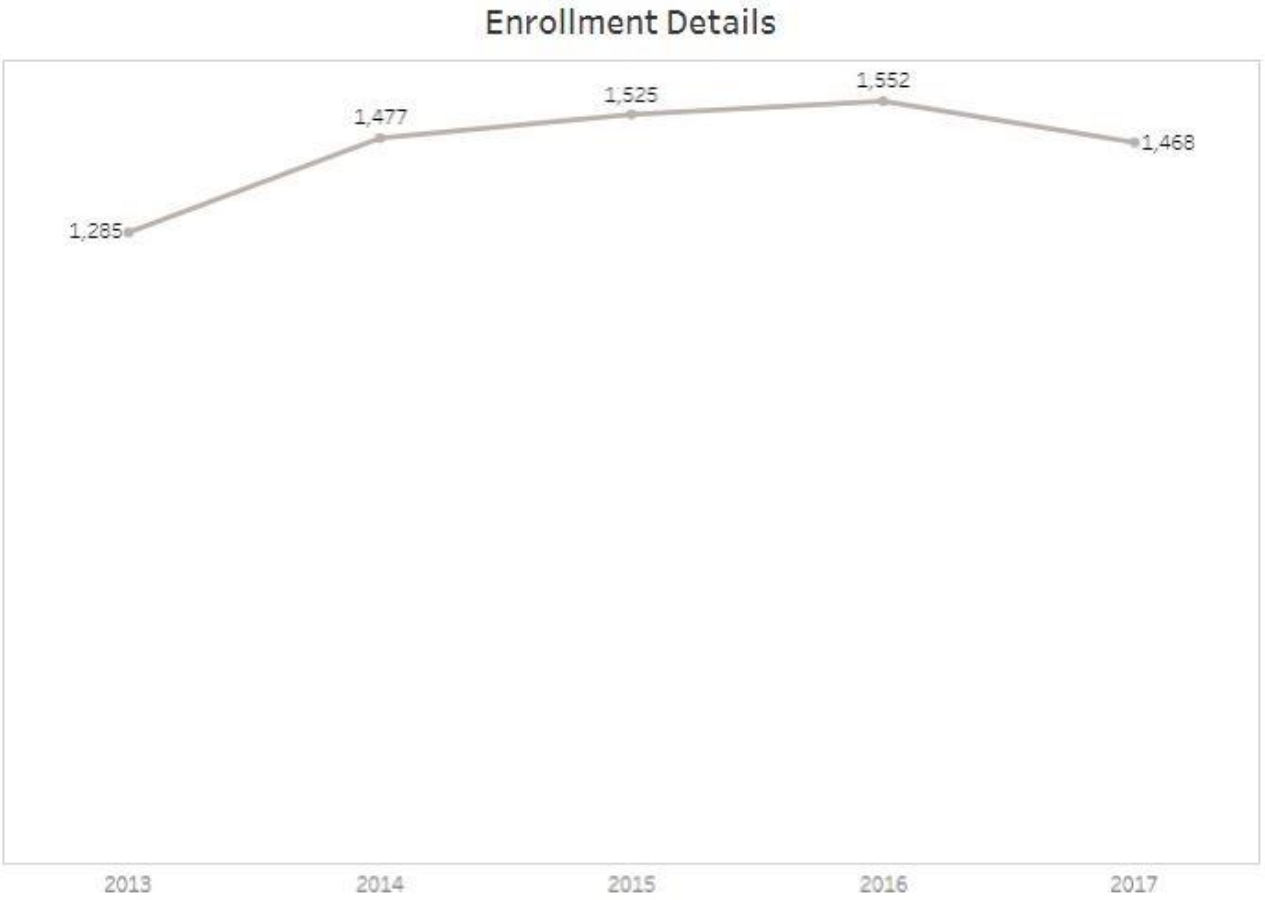
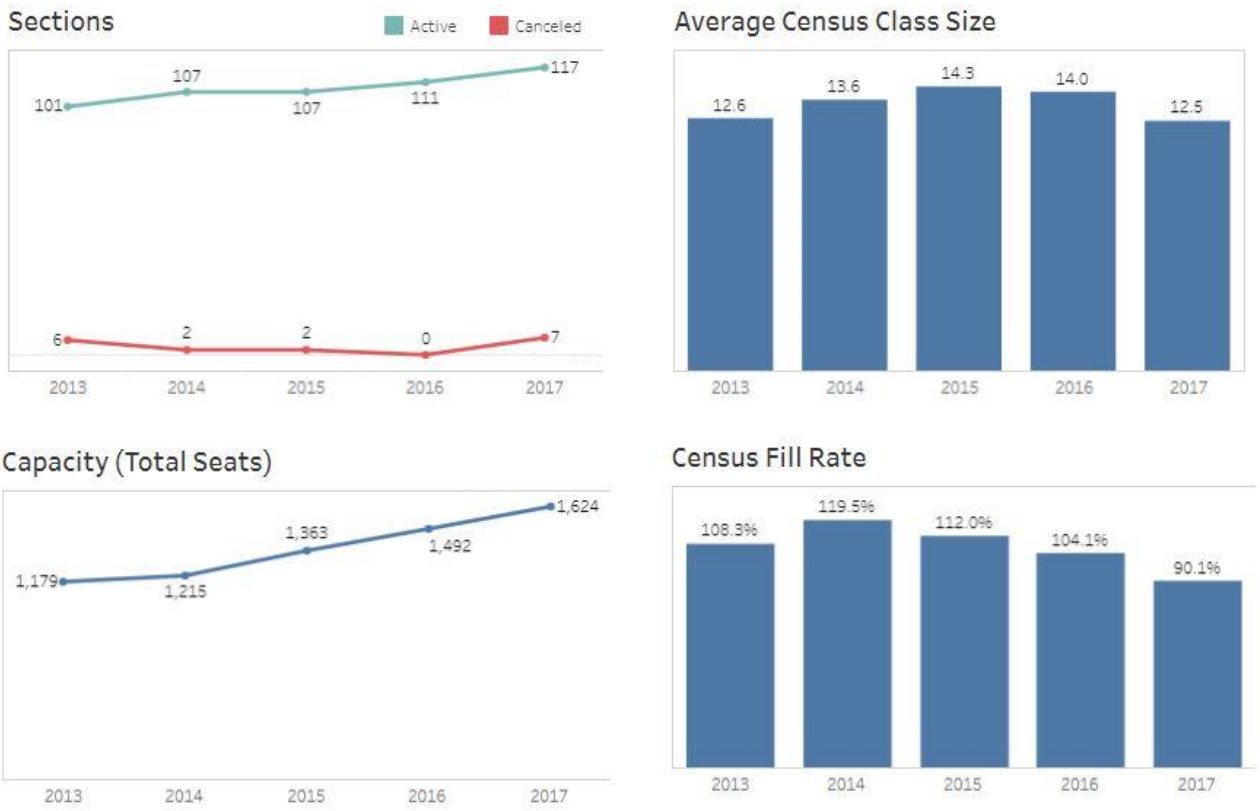


Figure 2



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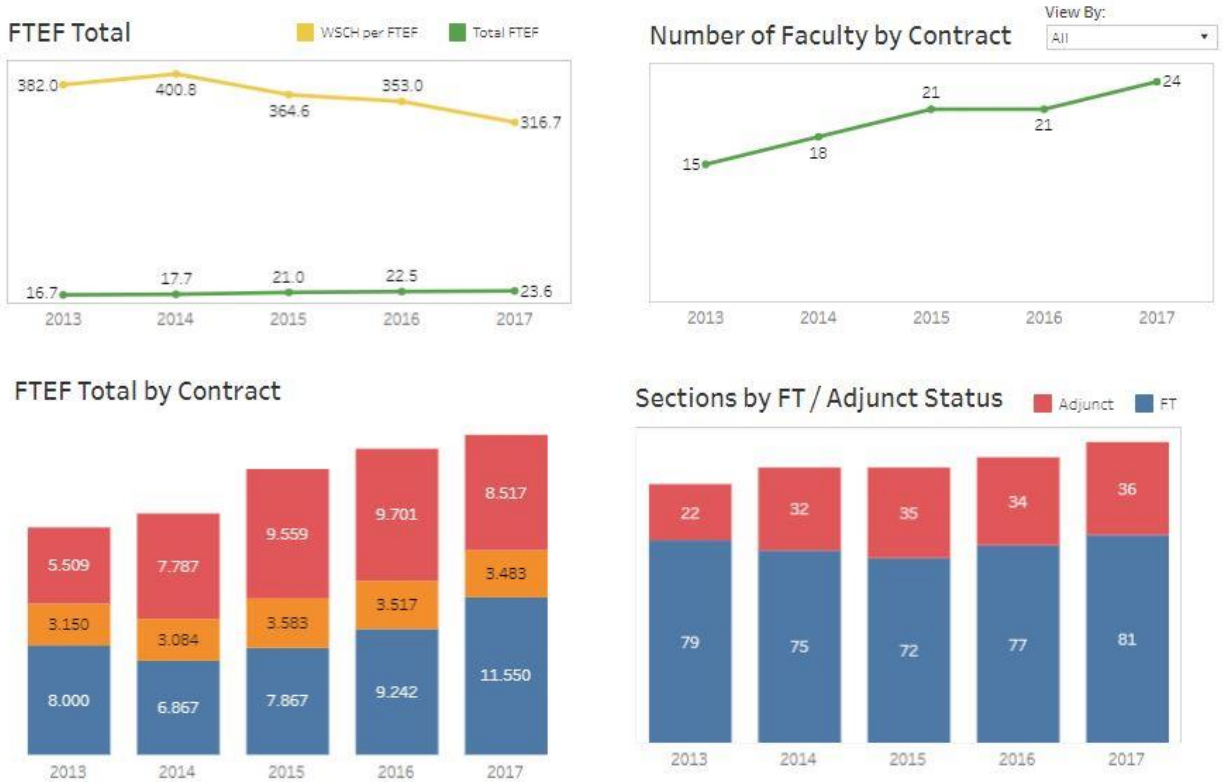

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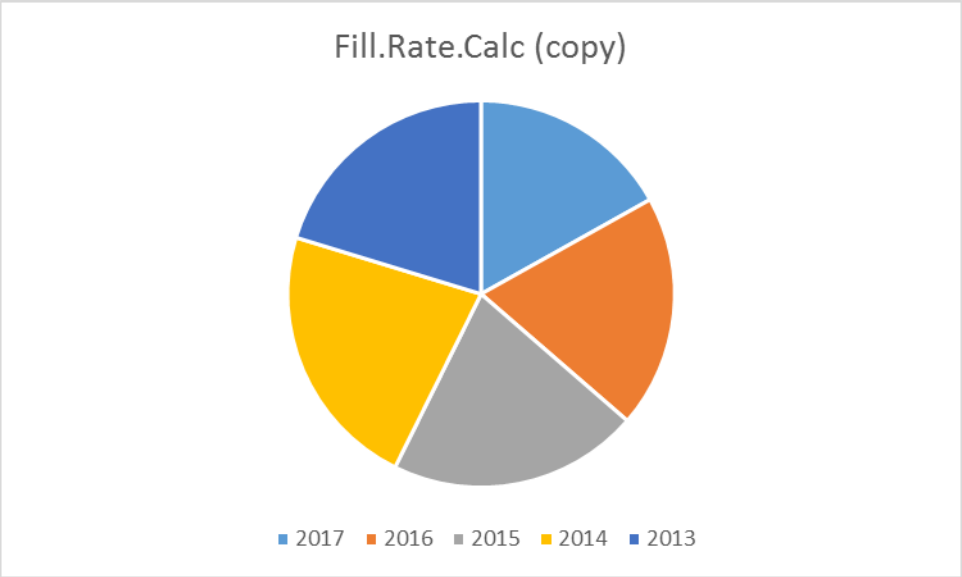

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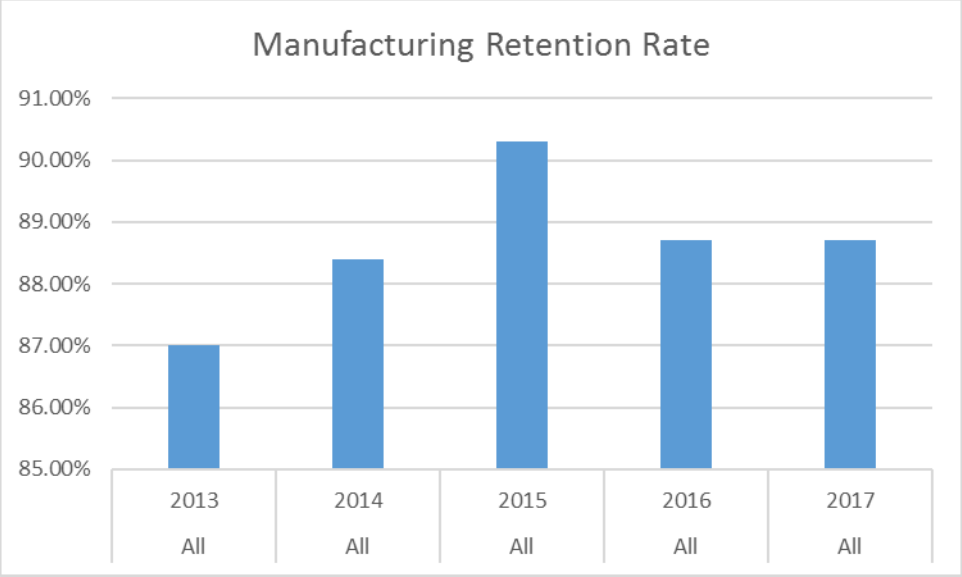

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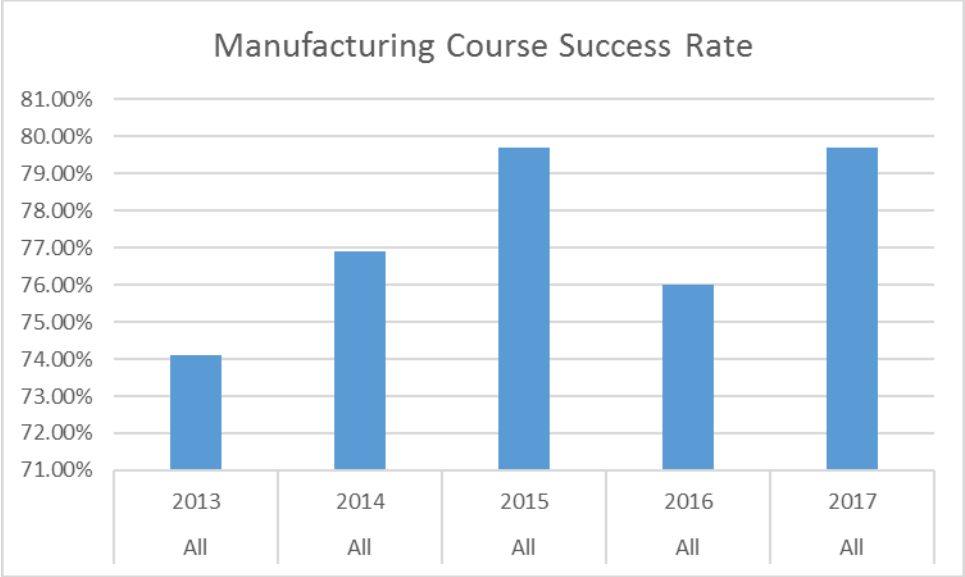

Figure 7

2.2 Peer Institution Comparison

Complete the table below.

How does your program compare with peer institutions? Provide a *narrative* of your comparison. (Peer institutions are colleges or programs identified by the Office of Institutional Research and Planning (OIRP)).

Table 2- College and Program

College/Program:	Fullerton	Fresno	Glendale	San Diego City	Santa Ana
Retention:	88.56%	90.73%	90.56%	87.13%	87.49%
Success:	77.72%	68.56%	85.82%	73.50%	77.51%
Degrees Awarded:	23	25	3	32	54
Certificates Awarded:	70	26	49	160	261
Transfers:	NA	NA	NA	NA	

Fullerton College Manufacturing program averages are very similar in comparison to the peer colleges in both Retention and Success. Fullerton's Degree and Certificate average are in the median among the other peer colleges with Santa Ana College and San Diego Community College ahead of Fullerton Community College. This is understandable since Santa Ana College and San Diego Community College have a greater number of sections offered in Manufacturing, resulting in a very large degree/certificate total.

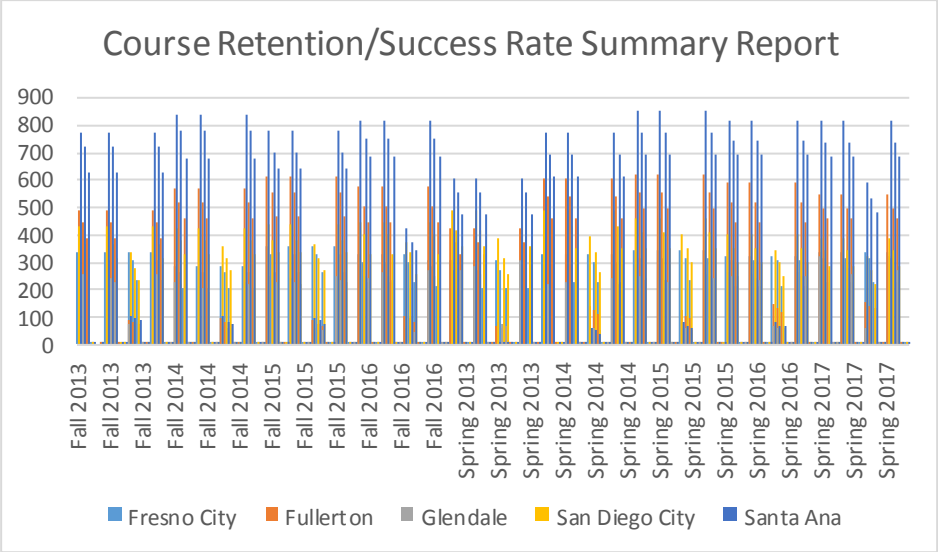

Figure 8

2.3 Achievement Gap

Indicate achievement gap for each of the groups listed below. (Attach to Appendix the Success and Retention by Ethnicity Data as identified by the Office of Institutional Research and Planning.)

Table 3-Group Retention and Success Percentage

Group	% Retention	% Success
Males	88.90	77.46
Females	86.34	75.60
Asian-American	86.24	72.90
African-American	77.60	54.62
Filipino	95.58	85.08
Hispanic	87.52	75.16
Native American	89.78	80.88
Other Non-White	88.82	73.78
Pacific Islander	86.67	63.33
White	90.64	81.40
Unknown	84.84	71.66
Range (Max-Min)	77.60-95.58	54.62-85.08

2.4 Program Effectiveness

Since your previous Program Review Self-Study, what significant changes have occurred that impact the effectiveness of your program?

In the last few years the machine, welding and drafting technology program facilities have continued to face challenges. As stated in the last Program Review, the new and refurbished facilities are smaller than what we previously had. The new machine lab is 15% smaller, classrooms that were supposed to fit 20+ students only fit 14, the CAD drafting program lost about 50% of its space. We have electrical outlets where we don't need power and don't have them in places where we do need them. Projector

screen heights are too low for students to see the full viewing area. This new poorly designed facility will continue to have a negative effect on the machine, welding and drafting programs for years to come. Although we have overcome some of the effects and have worked hard with the administration on new changes, the end result is that more space will be needed to sustain the current programs and to grow/implement new programs slated for as soon as Fall 2018 on. Increased responsibility on the part of the instructors for department duties such as repairs; scheduling; VTEA and similar grants; equipment proposals, ordering of supplies/materials; curriculum review; program review; advertising events/recruitment; and SLO's/SLOA have taken a toll on instructional activities for our customer base (students).

The welding department has seen the retirement of one 30 year full-time faculty and the hiring of two new full-time faculty. Significant Strong Workforce funding has been approved to implement program growth through the construction of a covered outdoor welding space to further train welders looking toward the structural and pipe fields of welding. New equipment for 5 GTAW booths and 6 FCAW stations was acquired within the last year.

Curriculum is being developed to continue the growth into NDT (Nondestructive testing) in welding, and certification of NDT technicians in VT (Visual Inspection), MT (Magnetic Particle Testing), and PT (Penetrant Testing).

The Machine Technology department has seen the hiring of one additional full time faculty to compensate for the retirement of two instructors in the past 7 years. This additional full time faculty member is working with the other full time faculty member to bring the programs up to industry and academic standards. A Metrology and Swiss CNC Lathe certificate program and courses are being developed and are currently in the process of curriculum approval which is slated for implementation in Fall 2018.

2.5 Describe any laws, regulations, trends, policies, procedures or other influences that have an impact on the effectiveness of your program. Please include any other data (internal or external) that may be relevant to student achievement, learning, and trends within your Basic Skills, CTE, or Transfer Education programs.

There are no new laws or regulations that effect our departments. There are some new trends with industry level certifications such as NIMS (National Institute of Metalworking Standards) and aerospace certifications such as ISO and AS 9100. Eventually NIMS certificates will be included in the machining program to go along with our existing certificates, this could be included in six year goals.

Emission laws and regulations on the energy and power industry have increased the interest in clean energy such as wind solar and hydro-electric and also in the petro-chemical side by incorporating new stack scrubbing and refining technologies. These new laws do not impact our program effectiveness at this time.

2.6 Provide any other data that is relevant to your self-study.

Manufacturing employment trends continue on the upswing as manufacturing has become a vital part of the US economy. According to the Los Angeles County Economic Development Corporation

The Kyser Center for Economic Research, about 73% of manufacturing jobs in Orange County are concentrated in durable goods (computers, machinery, aerospace parts and products, and medical devices). The balance of manufacturing workers produce nondurable goods such as pharmaceuticals, apparel and food. In 2015, total manufacturing jobs in Orange County increased by 2.7%
Orange County LAEDC Kyser Center for Economic Research 41 Economic Forecast, February 2016
to 163,100 workers with all four of Orange County's primary manufacturing sectors showing gains compared with 2014: fabricated metal products (up by 1.2%); machinery (1.0%); computer and electronic products (5.0%); and transportation equipment – primarily aerospace (1.3%). The LAEDC anticipates manufacturing employment will average 165,100 jobs for all of 2016, increasing to 167,000 in 2017.

According to National Association of Manufacturers (NAM) "The manufacturing sector has begun to turn a corner in recent months, trending in the right direction both in the United States and globally after struggling for much of the past two years. There is also a sense that many of the pro-growth policies that businesses have long sought, including tax reform, a major infrastructure package and regulatory relief may finally come to fruition. As a result, manufacturing leaders have shown increased optimism since the election. In March, the Manufacturers' Outlook Survey from the National Association of Manufacturers (NAM) rose to an all-time high in the survey's 20-year history, with 93.3 percent of respondents positive about their own company's outlook (Figure 9).

NAM MANUFACTURERS' OUTLOOK SURVEY
SECOND QUARTER 2017
July 20, 2017

Percentage of Respondents Positive in Their Own Company's Outlook	NAM Manufacturing Outlook Index
89.5% *(March: 93.3%)*	**60.9** *(March: 63.5 – revised)*
Small Manufacturers: **84.8%** *(March: 91.5%)* Medium-Sized Manufacturers: **90.6%** *(March: 93.8%)* Large Manufacturers: **92.8%** *(March: 93.9%)*	**Expected Growth Rate for SALES** **Over the Next 12 Months** ↑ 4.8% *(March: ↑ 4.9%)*
Expected Growth Rate for PRODUCTION **Over the Next 12 Months** ↑ 4.8% *(March: ↑ 4.8%)*	**Expected Growth Rate for EXPORTS** **Over the Next 12 Months** ↑ 1.1% *(March: ↑ 1.0%)*
Expected Growth Rate for CAPITAL INVESTMENTS **Over the Next 12 Months** ↑ 3.2% *(March: ↑ 2.1%)*	**Expected Growth Rate for PRICES** **Over the Next 12 Months** ↑ 1.7% *(March: ↑ 1.8%)*
Expected Growth Rate for FULL-TIME EMPLOYMENT **Over the Next 12 Months** ↑ 2.7% *(March: ↑ 2.3%)*	**Expected Growth Rate for INVENTORIES** **Over the Next 12 Months** ↑ 1.3% *(March: ↑ 0.8%)*
Expected Growth Rate for EMPLOYEE WAGES **Over the Next 12 Months** ↑ 2.1% *(March: ↑ 2.0%)*	**Expected Growth Rate for HEALTH INSURANCE COSTS** **Over the Next 12 Months** ↑ 8.4% *(March: ↑ 7.2%)*
"Do you think the United States is headed in the right direction, or is our country on the wrong track?" **RIGHT TRACK: 56.9% WRONG TRACK: 14.3% UNSURE: 28.9%** *(March: Right Track: 59.9%, Wrong Track: 9.4%, Unsure: 30.8%)*	

Figure 9

Three months later, manufacturers remain very upbeat. In the latest report, 89.5 percent were either somewhat or very positive about their own company's outlook. This pullback in confidence mirrors easing in other sentiment surveys, even as they continue to present an encouraging assessment of overall conditions. In this case, the percentage who are positive in their outlook has averaged 91.4 percent over the first and second quarters of 2017, the highest consecutive two-quarter average in the survey's history."

According to the American Welding Society (https://www.aws.org/foundation/page/workforce-development) "By 2015 our nation's workforce will need over 400,000 welders to satisfy the demands of several industries." These welders will need to be well trained and have an appreciation for continuous learning to keep up with the changing demands of the manufacturing environment. Increases in welded products and a general increase in quality awareness will lead to an increased demand for quality control and quality assurance inspection personnel. These inspectors will need to be trained in ethical standards and current manufacturing and construction requirements.

3.0 Strengths, Weaknesses, Opportunities, Challenges (SWOC)

Based on your analysis in 2.1 through 2.6, answer the following questions:

3.1 What are the strengths of your program?

The machining, welding and drafting programs offer instruction on state-of-the-art equipment and software that students will find used in local industry. Instructional programs and certificates are well respected by employers and students have many job opportunities. Employers continue to seek our students based on the technical skills that we provide students.

Welders, machinists and CAD/CAM programmers are among the highest paid and most sought after employees in the skilled trades. Machinist and Tool/Die Makers are in high demand and typically earn an average of about $60K to $80K per year. CNC programmers and CAD programmers typically make anywhere from $50K to $80k per year on average. In the heavy construction industry welders typically garnish among the highest wages of all skilled trades. (Ex. line local electrician welder makes at least $55/hr + full benefits package + any overtime which is 2X the normal rate). Not only are students trained in the field of welding, machining, and drafting but are trained for a life of learning after school. The strength of providing foundational skills for a manufacturing industry prepares students for opportunities in other fields such as inspection; quality control, quality assurance; technical support; manufacturing engineering; and consulting. An alumni database has be initiated to facilitate future surveys, this will allow Fullerton College to more accurately advise current students who seek jobs using their education in manufacturing

3.2. What are the weaknesses of your program?

We lack part time instructors that are able to teach advanced manufacturing topics. We lack staffing in the machine shop; welding; and drafting area to successfully carry out instructional goals. While we can get grants and funding for equipment we have been unable to add staffing to maintain and teach on this equipment. The tool crib area and student work stations contain thousands of small parts, precision tools and tooling for machines. A paid hourly assistant is needed to keep these tools in the proper place, working correctly, repaired when damaged, and accounted for at the end of classes. When machine shop or welding equipment tools are not properly stored and maintained they can cause dangerous conditions for students working in the lab.

Enrollment is less in the spring. We have a large number of high school students that graduate in the summer and fill the fall classes, whereas in the spring the tide of high school students seems to be diminished.

Lack of an hourly assistant available to the departments within the manufacturing program is a key deficiency currently faced. In order to stay on the leading edge of technological advancements available to industry the program must constantly upgrade and maintain equipment. A program assistant/tech would enable instructors to focus more appropriately on keeping up to date with industry instead of cleaning, organizing, maintaining and repairing shop equipment.

3.3 What opportunities exist for your program?

Grants and funding has allowed advanced manufacturing equipment to be purchased and implemented into new courses and program curriculum. The job outlook for manufacturing positions is excellent, steady growth should exist over the next ten years. The number of available high paying jobs is much more that than the number of qualified candidates available. There are tremendous employment opportunities in the aerospace, electrical, medical, energy and power industries. The demand for clean renewable energy is ever increasing, in an ever growing market. Growth in the quality control and assurance side of the industry is guiding to focus on additional instruction for inspection methods. The disparity between skilled manufacturing jobs and skilled workforce continues to increase and forecasts indicate that these skill gaps will only grow in the foreseeable future. The manufacturing program at Fullerton College is very well situated to help alleviate these gaps. Enrollment continues to be high and the local population is displaying an increased interest in manufacturing as a viable career choice for job seekers and recent high school graduates. Continuing manufacturing programs in core disciplines such as drafting; machining and welding allows us to develop more detailed programs which focus on a solid core education for the industry.

3.4 What challenges exist for your program?

The machine, welding and drafting programs are out of space to add new advanced manufacturing technologies. A major challenge will be to identify and occupy sufficient facility space to support new and existing program initiatives. Finding qualified instructors has also been a challenge. New courses and curriculum will require additional staffing. The lack of an hourly assistant to help maintain and manage the shop laboratories has made it very difficult for instructors to teach in the lab. The current full time instructors spend many hours of their own time during winter and summer breaks fixing, repairing, and maintaining equipment and shop tools. Many hours that are supposed to be instructional are spent fixing and repairing tools and equipment, cutting stock and other maintenance related tasks. We are in the process of obtaining more advanced manufacturing equipment that will be housed in the drafting, machine shop, and welding laboratories, an hourly staff position could be shared with these departments.

4.0 Student Learning Outcomes (SLO) Assessment

4.1 List your program level SLOs and complete the expandable table below.

Drafting Program

	Program Student Learning Outcomes (PSLOs)	Date Assessment Completed	Date(s) Data Analyzed	Date(s) Data Used For Improvement	Number of Cycles Completed
1.	Upon successful completion of the Industrial Drafting Associate in Science Degree the student will be able to demonstrate the skills and qualifications necessary for entry level employment in the mechanical computer-aided drafting design fields	6/2/2017	6/20/2017	09/1/2017	1
2.	Upon successful completion of the Industrial Drafting Certificate Level I the student will be able to demonstrate the skills and qualifications necessary for entry level employment in the mechanical computer-aided drafting design fields. Upon completion of the Level I Certificate, students will be prepared to continue to complete the Industrial Drafting Certificate Level II.	6/2/2017	6/20/2017	09/1/2017	1
3.	Industrial Drafting Certificate Level II is designed to provide focused technical grounding and exposes students to advanced drafting design technologies. This certificate enables students to pursue competitive employment in the mechanical design field, beyond entry level.	6/2/2017	6/20/2017	09/1/2017	1

Machine Technology Program

	Program Student Learning Outcomes (PSLOs)	Date Assessment Completed	Date(s) Data Analyzed	Date(s) Data Used For Improvement	Number of Cycles Completed
1.	Upon successful completion of CNC Operator Certificate the student will be able demonstrate the skills and mastery of theoretical knowledge required for entry level employment in machining occupations.	6/2/2017	6/25/2017	08/30/2017	1
2.	Upon successful completion of Machine Technology Level 1 Certificate the student will be able Gain entry level employment in a manufacturing company with machine tools.	6/2/2017	6/25/2017	08/30/2017	1
3.	Upon successful completion of Machine Technology Level 2 Certificate the student will be able to Gain entry level employment in a manufacturing	6/2/2017	6/25/2017	08/30/2017	1

	company with machine tools.				
4.	Upon successful completion of Computer Numerical Control (CNC) Certificate the student will be able to; Gain entry level employment in as a CNC programmer in a manufacturing company with CNC machinery.	6/2/2017	6/25/2017	08/30/2017	1
5.	Upon successful completion of Mastercam Skills Certificate the student will be able to; Demonstrate the use of Mastercam software to accurately program multi axis CNC machine tools.	6/2/2017	6/25/2017	08/30/2017	1
6.	Upon successful completion of Surfcam Skills Certificate the student will be able to; Demonstrate the use of Surfcam software to accurately program multi axis CNC.	6/2/2017	6/25/2017	08/30/2017	1

Welding Program

	Program Student Learning Outcomes (PSLOs)	Date Assessment Completed	Date(s) Data Analyzed	Date(s) Data Used For Improvement	Number of Cycles Completed
1.	Demonstrate one or more of the five core welding processes	9/9/16	9/9/16	9/10/16	1
2.	Demonstrate cod compliance requirements for welding	9/9/16	9/9/16	9/9/16	1

4.2 Assessment: Complete the expandable table below.

Drafting Program

Program Student Learning Outcomes **Assessment for Instructional Programs at Fullerton College**			
Intended Outcomes	**Means of Assessment & Criteria for Success**	**Summary of Data Collected**	**Use of Results**
1. Upon successful completion of the Industrial Drafting Associate in Science Degree the student will be able to demonstrate the skills and qualifications necessary for entry level employment in the mechanical computer-aided drafting design fields.	The assessment is conducted in the final. 2 processes are required to complete the project in the final. If both processes are not achieved correctly, then the assessment would not be considered a success.	All courses in the Drafting program are measured in a similar fashion using 2 processes in a final to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.
2. Upon successful completion of the Industrial Drafting Certificate Level I the student will be able to demonstrate the skills and qualifications necessary for entry level employment in the mechanical	The assessment is conducted in the final. 2 processes are required to complete the project in the final. If both processes are	All courses in the Drafting program are measured in a similar fashion using 2 processes in a final to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if

computer-aided drafting design fields. Upon completion of the Level I Certificate, students will be prepared to continue to complete the Industrial Drafting Certificate Level II.	not achieved correctly, then the assessment would not be considered a success.		improvement is required.
3. Industrial Drafting Certificate Level II is designed to provide focused technical grounding and exposes students to advanced drafting design technologies. This certificate enables students to pursue competitive employment in the mechanical design field, beyond entry level.	The assessment is conducted in the final. 2 processes are required to complete the project in the final. If both processes are not achieved correctly, then the assessment would not be considered a success.	All courses in the Drafting program are measured in a similar fashion using 2 processes in a final to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.

Machine Technology Program

Program Student Learning Outcomes **Assessment for Instructional Programs at Fullerton College**			
Intended Outcomes	**Means of Assessment & Criteria for Success**	**Summary of Data Collected**	**Use of Results**
1. Upon successful completion of CNC Operator Certificate the student will be able demonstrate the skills and mastery of theoretical knowledge required for entry level employment in machining occupations.	The assessment is conducted in the final. Two critical outcomes of the SLOs' are required to complete the assessment. If both outcomes are not achieved correctly, then the assessment would not be considered a success.	All courses in the machining program are measured in a similar fashion using two outcomes in a final test or assignment to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.
2. Upon successful completion of Machine Technology Level 1 Certificate the student will be able Gain entry level employment in a manufacturing company with machine tools.	The assessment is conducted in the final. Two critical outcomes of the SLOs' are required to complete the assessment. If both outcomes are not achieved correctly, then the assessment would not be considered a success.	All courses in the machining program are measured in a similar fashion using two outcomes in a final test or assignment to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.
3. Upon successful completion of Machine Technology Level 2 Certificate the student will be able to Gain entry level employment in a manufacturing company with machine tools.	The assessment is conducted in the final. Two critical outcomes of the SLOs' are required to complete the assessment. If both outcomes are not achieved correctly, then the assessment would not be considered a success.	All courses in the machining program are measured in a similar fashion using two outcomes in a final test or assignment to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.
4. Upon successful completion of Computer Numerical Control (CNC) Certificate the	The assessment is conducted in the final. Two critical outcomes	All courses in the machining program are measured in a similar	At the time of last assessment, the success rate was 95%.

student will be able to; Gain entry level employment in as a CNC programmer in a manufacturing company with CNC machinery.	of the SLOs' are required to complete the assessment. If both outcomes are not achieved correctly, then the assessment would not be considered a success.	fashion using two outcomes in a final test or assignment to determine success.	The next assessment outcome will determine if improvement is required.
5. Upon successful completion of Mastercam Skills Certificate the student will be able to; Demonstrate the use of Mastercam software to accurately program multi axis CNC machine tools.	The assessment is conducted in the final. Two critical outcomes of the SLOs' are required to complete the assessment. If both outcomes are not achieved correctly, then the assessment would not be considered a success.	All courses in the machining program are measured in a similar fashion using two outcomes in a final test or assignment to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.
6. Upon successful completion of Surfcam Skills Certificate the student will be able to; Demonstrate the use of Surfcam software to accurately program multi axis CNC	The assessment is conducted in the final. Two critical outcomes of the SLOs' are required to complete the assessment. If both outcomes are not achieved correctly, then the assessment would not be considered a success.	All courses in the machining program are measured in a similar fashion using two outcomes in a final test or assignment to determine success.	At the time of last assessment, the success rate was 95%. The next assessment outcome will determine if improvement is required.

Welding Program

Program Student Learning Outcomes **Assessment for Instructional Programs at Fullerton College**			
Intended Outcomes	**Means of Assessment & Criteria for Success**	**Summary of Data Collected**	**Use of Results**
1. Increase student employability in the diverse job roles of local industry.	Welded joints on lab sign-off sheets are individually inspected and then either accepted or rejected per the applicable American National Standards Institute welding code or specification.	Students work though a lab sign-off sheet that covers the 4 basic welding positions on each of the 5 basic joint configurations. Students perform these exercises using each of the five core welding processes. Those who successfully complete the lab sign-off sheet are typically able to take and pass a certification test using the given welding process. Many students in the welding program find employment	In lecture and lab time increase emphasis the importance of industrial certification and the benefits of completing the Welding Certificate and Associate in Science in Manufacturing Technology.

		immediately following or even prior to completing the certificate program.	
2. Enable students to take and pass industrial certification tests.	Third party industrial certification welding tests to an applicable American Welding Society welding code.	Those who successfully complete the lab sign-off sheet are typically able to take and pass a certification test using the given welding process.	In lecture and lab time increase emphasis the importance of industrial certification and the benefits of completing the Welding Certificate and Associate in Science in Manufacturing Technology.

4.3 What percentage of your program level SLOs have ongoing assessment? Comment on progress/lack of progress.

100% of courses are assessed per Student Learning Outcome Assessment questions built into the final exam or skill demonstration process established. While tasks have been identified data collection and conformance from all program instructors has been challenging. New procedures to collect and maintain data need to be established to conform to this requirement. 100% of SLO's have ongoing assessment, all SLO's were evaluated during the Fall 2016 semester.

4.4 How has assessment of program level SLOs led to improvements in student learning and achievement?

Additional focus has been applied to Student Learning Outcome Assessment and lecture and demonstration portions of courses have been modified to provide the best possible outcomes. Assessment of program level SLO's has reinforced the knowledge that students need to be regularly encouraged and informed of the benefits of Industrial Certifications, school Certificates of Completion and Associate Degrees.

4.5 How has assessment of program-level SLOs led to improvements in transfer or certificate/degree awards?

Improvement in certificate achievement has been greatly increased since the inception of the Student Learning Outcomes and Assessments. Students are more focused on critical skills that are required for the successful completion of courses.

4.6 What challenges remain to make your program level SLOAs more effective?

Communication and collaboration with adjunct instructors with busy work schedules is difficult at best when reviewing and discussing Student Learning Outcomes and Assessments. Set procedures and reporting needs to be established to make this work. Student attrition is a leading cause of any lack of performance in SLOAs. Program level SLOAs are effective for students who persevere through the entire programs.

5.0 Evaluation of Progress Toward Previous Goals/SAP's (Future program review templates for this section will identify "previous goals" as "previous *strategic action plans*"-- SAP's.)

5.1 List the goals from your last self-study/program review.

Short Term goals (two year cycle) (previous strategic action plans 2014-2017)

Goal #1
Faculty will upgrade skills and knowledge of current industry standards.

- Measurable outcome: Skill upgrading will prepare faculty to better prepare the student for job opportunities if faculty are knowledgeable in the latest trends and standards that employers seek in qualifying positions. Faculty will attend staff development classes and specific program related workshops/seminars.

Goal #2
Maintain state of the art labs through strategic and planned purchasing of equipment and software.

- Measurable Outcome: Using the advice offered by the Advisory committees, the programs will remain competitive with the current standards of local industry.

Goal #3
Implementation of industrial certification program CRAW (Certified Robotic Arc Welding) at two levels; A) Certified Robotic Arc Welding Technician and B) Certified Robotic Arc Welding Operator. This is a nationally based certification program required in industry for Code compliant welding using Robotic Welding Equipment. This industrial welding certification requires that the applicant for testing pass a written exam and practical programming test based on a pre-defined and industrial format.

Facilities that give the certification test must be approved to do so by the American Welding Society (AWS). The facility must have test supervisors that have passed the test themselves and are currently AWS Certified Welding Inspectors. Testing facilities must also have Robotic Cell Welding Equipment.

The Welding Industrial Advisory committee has recommended that FC Welding Program implement this to help meet the needs of manufacturing. At present there is not a testing center on the west coast.

- Measurable Outcome: The facility and faculty will receive certification by the American Welding Society (AWS).

Action Plan

1. Develop curriculum so students can be certified in this welding discipline.
2. Faculty must upgrade skills to obtain CRAW certification. Estimated at 2 @ $2,000.
3. Conduct lab inspection by AWS – estimated at $2000.
4. Install robotic welding equipment – FC welding program currently has purchased this through VETA grants.
5. Configure lab space. This will require approximately 1800 sq. ft. of lab space. Projected lab space could come from RM 703 Tech Ed Building.

Note: Welding instructor who was AWS CRAW project champion has retired. Current new faculty will need to receive training as listed above. Lab inspections by AWS must be performed. Robotic welding equipment has been set up in room 703.

Goal #4
Convert use of Room 703 to Welding from Woodworking.
Fullerton College upgraded the welding equipment and added 22 welding stations to its program in the remodeling project 2010. This gave the department 84 welding training stations in the 700 building. The addition of welding equipment can be supported by placing equipment to the 703 lab that is located next to the 705/709 welding lab. Equipment that would be located in the 703 lab would be:

1. Welding Robotic cell
2. Submerged arc welding station
3. Welding Fabrication cell
4. 24" Hydraulic Shear and metal Punch
5. 18"Hydrolic Shear
6. (2) 30" sheet metal foot shears
7. Rotex Sheet metal punch (to be purchased)
8. (2) Drill presses (in need of repair at this time)
9. CNC Plasma cutting table
10. Pyramid metal bender
11. 1-1/2" Horizontal band saw
12. Burr King Grinder
13. Coping tube grinder
14. Tube bender
15. Tensile Test Machine
16. Hardness Tester
17. Guided bend tester
18. Cold Saw
19. Hand Plasma Cutter
20. Beverley shear
21. Hydraulic Beverly shear
22. (3) 48"X 96" steel lay out tables
23. 48" X 96" Burning Table (This and other cutting equipment will require ventilation)
24. Pipe beveling station

- Measureable Outcome: The facility will be converted for use by a program preparing students for high demand, high skill and high wage occupations.

Note: Welding status update as of 10-21-17-Approximately 90% of equipment listed above has been installed and is in use in room 703.

Long term goals (six year cycle) (previous strategic action plans 2014-2017)

Goal #1 – Incorporate inspection techniques into the Blueprint Reading and Geometric Dimensioning classes.

Goal #2 – Continue four year Machinist training partnership with Disneyland.

Goal #3 – Continue to update and replace old worn out equipment in the machine tool laboratory.

Goal #4 – Add additional CNC turning capabilities that include milling features to keep up with local industry needs.

5.2 Describe the level of success and/or progress achieved in the goals listed above.

Short Term Goals- Status update as of 10-17-17

Goal #1
Faculty in the Manufacturing department (Machine, Drafting, and Welding) have attended industry sponsored seminars and workshops to ensure current industry needs are be included in course curriculum. Machine Technology faculty have attended the IMTS show in Chicago in 2016 to review and observe the latest machining and manufacturing trends in the country. In addition, the Machine Technology faculty have attended a number of vendor sponsored training sessions on equipment and tools purchased for the lab.

Goal #2
State of the art equipment recommended by our vocational advisory committees has been purchased and in line with request #1 and #2 from last program review. A 3d printer and laser scanner is now being used in in the drafting program. Request #3 was not awarded, the machine shop program continues to use equipment that in some cases is over thirty years old and in need of replacement. The machine shop has utilized VTEA funding to satisfy funding requirements for a multiple axis CNC machine tool as request #4 was not awarded as the result of the last program review.

Goal #3 & #4
Proposed by the welding program, equipment has been delivered and stored in the former woodshop, room 703. Approximately 80% of equipment proposed for use in room 703 is currently in use. Retirement of one faculty member and hiring of two new faculty members will require training for new faculty members to reinitiate instructor and lab AWS CRAW certification. Equipment listed above has been installed and is currently in use. Several items are in need of repair and service.

Long Term Goals-Status update as of 10-17-17

Goal #1- Achieved - Inspection tools purchased and use of measuring tools has been included into the course curriculum. Students are better prepared for other manufacturing courses and on the job situations. A new Metrology program is slated to become a program in Fall 2018. Curriculum review and approval is in process and should be approved by the State of California in time for Fall 2018.

Goal #2- Achieved – To date we have had approximately sixteen Disney trainees in the last six years of this program. There will be an additional six more graduate recruits added each Spring semester. The program will continue with 4-6 trainees completing the program at the end of every Fall semester. The trainees will be able to apply for higher paying skilled jobs within Disneyland.

Goal #3- In process- Some older equipment has been surpluses due to lack of space in the 905 machine shop laboratory, other equipment is being traded in with the purchase of VTEA related equipment. Two more engine lathes may be replaced if equipment request is approved, more equipment may also be replaced with possible grants that have yet to be rewarded. This is a crucial and important goal to achieve, the old worn out equipment must be replaced.

Goal #4- In the implementation process- One CNC turning machine with milling capabilities has been delivered to the 905 laboratory, installation is complete. The machine was purchased with a VTEA grant in advanced manufacturing that also includes CNC CMM inspection equipment and more CNC machines that will be purchased over a three year period.

5.3 How did you measure the level of success and/or progress achieved in the goals listed above?

By the added student competencies learned by properly using precision measuring tools, success and future success of students in the Disney training program, by having equipment listed in the goals purchased and delivered to the machine tool laboratory. To date we have had 20 students commence the Disney program of which 16 have completed the program after 4 years. Students may be dropped for various reasons by Disney management however no students were dropped on behalf of Fullerton College. At this time, the data shows that we have an 80% completion rate of those students that were initially enrolled in our courses at Fullerton College.

5.4 Provide examples of how the goals in the last cycle contributed to the continuous quality improvement of your program.

The goals from the last program review have focused us on future trends in instruction, developing partnerships with employers and adding new relevant advanced manufacturing technologies requested by our advisory committee, students and local industry.

5.5 In cases where resources were allocated toward goals in the last cycle, how did the resources contribute to the improvement of the program?

Currently two new engine lathes will replace older worn out engine lathes in the machine shop. This will improve the quality of instruction in four of our classes representing six sections and serving sixty to eighty students. We have also incorporated some more CNC instruction on set-up and programming into the more advanced manual machining courses.

5.6 If funds were not allocated in the last review cycle, how did it impact your program?

We currently are providing instruction on some machine tools that lack features such as threading, automatic feeding of certain devices and safety features. These features are normal machine tool functions that students need to gain competency on to gain employment in this area. We need to aggressively replace older worn out machines tools in the machining program or instruction will continue to be adversely affected. The CNC FEMCO machine presents an immediate danger to students and faculty who use the machine. The machine door lock safety feature does not function correctly and as a result we have had 3 tool crashes since the last program review 3 years ago. We are also in need of replacing 2 older CNC lathes and 2 older mills in the machine shop that do not work properly. These machines will require much needed attention and repair in order to make them completely operational.

6.0 Strategic Action Plans (SAP) [formerly called Goals (6) and Requests for Resources (7)]

Using the tables below, list the strategic action plans (SAPs) for your program. These plans should follow logically from the information provided in the self-study. Use a separate table for each SAP.

SAPs for this three-year cycle:

STRATEGIC ACTION PLAN # 1	
Describe Strategic Action Plan: (formerly called short-term goal)	Add an hourly lab associate position that can help maintain the tools and equipment in the drafting, machine and welding laboratory. Hourly assistant can also assist maintaining advanced manufacturing inspection equipment. Requesting enough funds for 40hrs per week at $25.00 per hour for 40 weeks.
List College goal/objective the plan meets:	College Goal #:1 Objective #: 2,5
Describe the SAP: (Include persons responsible and timeframe.)	Machine Technology Coordinator. Position needs to be added as soon as possible. The Fall 2018 time is in alignment with other goals necessary to accomplish timelines stated in this report.
What *Measurable Outcome* is anticipated for this SAP?	Having a maintained tool crib, equipment and lab area will enhance the student's educational experience and allow instructors to spend more time teaching and not fixing, repairing, maintaining and keeping inventory of tools and supplies.
What specific aspects of this SAP can be accomplished without additional financial resources?	None

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel	60,000 per year	Strong Workforce Funding
Facilities		
Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	60,000 per year	

STRATEGIC ACTION PLAN # 2	
Describe Strategic Action Plan: (formerly called short-term goal)	Replace aging CNC/manual lathes and mills (2 each) in the 905 lab with safe and updated machines required to run the sophisticated software that is currently being used to teach our program courses.
List College goal/objective the plan meets:	College Goal #: 1 Objective #: 2,5
Describe the SAP: (Include persons responsible and timeframe.)	All instructors that utilize the lab to teach their courses. To be added as soon as possible. The Fall 2018 time is in alignment with other goals necessary to accomplish timelines stated in this report.
What *Measurable Outcome* is anticipated for this SAP?	Will clearly enhance the students' performance and ability to quickly and more accurately complete lab assignments which are the main goal of these courses. Completion rate of students through courses would be a measureable outcome at this time. A conservative expected increase of completion rate for courses would be 5%-10%.
What specific aspects of this SAP can be accomplished without additional financial resources?	None

If additional financial resources would be required to accomplish this SAP, please complete the section below. Keep in mind that requests for resources must follow logically from the information provided in this self-study.

Type of Resource	Requested Dollar Amount	Potential Funding Source
Personnel		
Facilities		
Equipment	$205,000.00	VTEA/Grant funding
Supplies		
Computer Hardware		
Computer Software		
Training		
Other		
Total Requested Amount	$205,000.00	

7.0 Long Term Plans

Describe the long-term plans (four-six years) for your program. Please consider future trends in your narrative. (Identifying financial resources needed for these plans is optional.)

Goal #1 – Continue four year Machinist training partnership with Disneyland.

Goal #2 – Continue to update and replace old worn out equipment in the machine tool laboratory with new traditional industry standard conventional equipment. Update, one to two, each conventional lathes and mills with new hybrid combination manual and CNC machines.

Goal #3 – Add additional CNC turning capabilities that include milling features along with dual spindles to keep up with local industry needs.

Goal #4 – Add additional CNC milling capabilities with industry standard controls and five axis of movement.

Goal #5 – Continue to maintain software maintenance on all CAD / CAM / Inspection software. Keeping the software current means our students are always learning the latest technology available.

Goal #7 – Add an hourly student assistant to the Machine and Welding technology program to maintain tools, equipment and cut stock for student projects in the laboratory.

Goal #8- Outdoor welding operation for structural steel welding of FCAW and SMAW processes. Convert the existing concrete slab to an overhang area where it can be used for welding areas and some metal storage. The wall along the back fence near the baseball field can be lined with shaded glass so that students walking by can see inside at the actual welding taking place. Also night classes held at this location would cause large beams of light and could be seen from far away creating a spark of interest amongst students who normally would not have examined the trade.

Goal #9- Begin an NDT certification program, using the brick enclosure behind room 703. Set up a Liquid penetrant station, and an area to do magnetic particle testing. This would allow the welding department to certify students in PT, MT and VT level 1. This would be very beneficial to students heading into the welding industry or an optional route that stays within the welding world. With this proposal a small formal lab area that can double as an inspection lab can be built with a few microscopes and metal polishing stations for a formal hands on experience studying metals and the fundamentals of welding metallurgy.

Goal #10 – Create a class covering topics of industrial management that could serve as a capstone class for various manufacturing programs. This course would be geared towards helping students to understand operations management principles as used in manufacturing and construction. Students enrolling in this course would be prepared to take the nationally recognized American Welding Society Certified Welding Supervisor examination. In order to implement this class an instructor would need to earn a Certified Welding Supervisor certification and attend the American Welding Society Certified Welding Supervisor online seminar to prepare for the exam.

8.0 Self-Study Summary

This section provides the reader with an overview of the highlights, themes, and key elements of this self-study. It should not include new information that is not mentioned in other sections of this document.

Faculty continues to update their skills due to ever changing software upgrades and changing technologies. Faculty are involved in ongoing training which is required to properly demonstrate and instruct students with recently acquired inspection equipment and machine tools.

The continued Machinist training partnership with Disneyland has grown stronger and has major approval with Disney executives and student employee's. The college has benefited with an enrollment boost due to the program. The end of the Fall 2017 semester will mark the sixth year Disney has had graduates. To date we have had 16 plus Disney graduates who have completed the program.

Advanced measuring tools and software are being implemented as part of the three year VTEA proposal in advanced manufacturing. This high tech measuring equipment is portable and can be easily moved into other classrooms and laboratories. Many student inquiries on when classes will be offered have already taken place. The purchase of the CNC turning machine with milling capabilities has raised the level of machining technology for the machine program which also supports the advanced manufacturing three year VTEA program.

The request to update the aging computers in the lab will allow for the increasing sophistication of software development. This will allow students to create solid models, prints and tool path programming, with less computer lockups and faster speeds for both the Drafting and Machining software.

The request for the hybrid combination CNC equipment will help students bridge the gap from using conventional machine tools to moving onto advanced computer controlled CNC equipment.

The addition of an hourly staff position will greatly enhance the students learning experience in our machine tool laboratory.

Each department is looking for creative ways to solve challenges dealing with growing programs and limited space.

9.0 Publication Review

Fullerton College is committed to assuring integrity in all representations of its mission, programs, and services. As such, during the program review self-study process programs are required to document their publications (websites, brochures, pamphlets, etc.), when they were last reviewed, and denote the publication is accurate in all representations of the College and program missions and services. In the far right column please provide the URL where the publication can be accessed. If it cannot be accessed via the Internet, please contact Lisa McPheron, Director of Campus Communications at lmcpheron@fullcoll.edu.

Information on the college's graphic standards is available here: http://news.fullcoll.edu/campus-communications/web-help/graphics/.

Please identify when the publication was last reviewed, and confirm that it is accurate in how it represents the college. In the far right column please provide the URL where the publication can be accessed. If it cannot be accessed via the Internet, please provide a sample of the publication with your program review self-study.

For publications that you have identified as inaccurate, please provide the action plan for implementing corrections below.

Note: All brochures and pamphlets in the manufacturing area at this time are under review for revision. Personnel in the Technology and Engineering Division office have been assigned a project to review all CTE program brochures and pamphlets. Tentative project completion date is January 2018.

Table 4-Publications

Publication	Date last reviewed	Is the information accurate?	URL of publication
Fullerton College Technology and Engineering Website	10-7-17	Yes	http://techneng.fullcoll.edu/
Fullerton College Machine Technology Website	10-7-17	Yes	http://machine.fullcoll.edu/
Fullerton College Drafting Technology Website	10-7-17	Yes	http://techneng.fullcoll.edu/drafting.html
Fullerton College Welding Technology Website	10-7-17	Yes	http://techneng.fullcoll.edu/welding.html
Manufacturing Technology brochure/pamphlet	10-7-17	Yes	NA
Welding Technology brochure/pamphlet	10-7-17	Yes	NA
Drafting Technology brochure/pamphlet	10-7-17	Yes	NA

MANUFACTURING TECHNOLOGY

PROGRAM INFORMATION

The Manufacturing Technology Program at Fullerton College provides students with a variety of classes in machining, welding, drafting, CAD, CAM, and metallurgy. These courses are taught by instructors with real world experiences. Classes provide students with experiences necessary to be successful in manufacturing related jobs.

PROGRAM OPTIONS

- Vocational certificates are offered in Welding, Drafting, Machining, and Computer Numerical Control.
- Associate of Science Degrees are available in Manufacturing Technology and Industrial Drafting.
- Skill upgrading and retraining by taking specific classes of interest.

CAREER OPPORTUNITIES

The program in Manufacturing Technology may lead to employment in a wide variety of job descriptions in such areas as manufacturing, construction, medical, and aerospace industries.

SPECIAL FEATURES

The Fullerton College Manufacturing Department maintains modern laboratories to provide "hands-on" experiences in CAD, CAM, machining, welding, and drafting.

[illegible]

North Orange County Community College District
Board of Trustees
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MANUFACTURING TECHNOLOGY

FULLERTON COLLEGE

A Place to Discover Yourself,
A Place to Grow

Fullerton College can provide you with the education you'll need to succeed both personally and professionally in today's complex society.

Whether you are interested in college transfer or vocational training, in gaining new skills or upgrading current ones - whatever your need, at Fullerton College you will have the opportunity to prepare for tomorrow's world, for life!

Fullerton College
Manufacturing Technology Department

Industrial Drafting Certificates

Level I - Requires the completion of a minimum of 18 units with a grade of "C" or better in each course taken. At least one half of the units toward the certificate must be completed at Fullerton College.

Required Courses (18 units)	
DRAF 70 Blueprint Reading for the Metal Trades (2)	MACH 116 Machine Tools (2)
DRAF 140 AutoCAD for Industry (2)	MACH 50 CNC Program. Using MastrCAM (3) or
DRAF 173 Geometric Dimensioning & Toler. (2)	MACH 060 CNC Programming Using SurfCAM (3)
DRAF 171 Fundamentals of Drafting (2)	WELD 121A Introduction to Welding (2)
	ARCH 124 Architectural CAD I (3)

Level II - Requires the completion of the Level I certificate requirements plus a minimum of 19-20 units of required courses for a total of 37-38 units. A grade of "C" or better is required in each course taken. At least one half of the units toward the certificate must be completed at Fullerton College.

Completion of Level I, plus: Required Courses (19-20 units)	
DRAF 141 Advanced CAD for Industry (2)	MACH 52 Adv CNC Program w/ MasterCAM (3) or
DRAF 143 3D Applications using AutoCAD (2)	MACH 62 Adv CNC Program. using SurfCAM (3)
DRAF 944 Solidworks (3)	METL 192 Fundamentals of Metallurgy (3)
MATH 15 Pre-Algebra (4) or	TECH 108 Manufacturing Processes (3)
TECH 81 Technical Mathematics I (3)	

Mastercam Skills Certificate

The **Mastercam Skills Certificate** requires a total of 6 units. Both classes must be completed with a grade of "B" or better.

Required Courses (6 units)
MACH 50 CNC Programming using Mastercam (3)
MACH 52 Advanced CNC Programming using Mastercam (3)

Surfcam Skills Certificate

The **Surfcam Skills Certificate** requires a total of 6 units. Both classes must be completed with a grade of "B" or better.

Required Courses (6 units)
MACH 60 CNC Programming using Surfcam (3)
MACH 62 Advanced CNC Programming using Surfcam (3)

Machine Technology - Level I Certificate

The **Machine Technology - Level I Certificate** Program requires the completion of 17-18 units with a minimum grade of "C" in each course taken. At least one half of the units toward the certificate must be completed at Fullerton College.

Required Courses (17-18 units)	
MACH 86 CNC Machine Set-up and Operation (3)	MACH 92 Intermediate Machine Tools (5)
MACH 91 Introduction to Machine Tools (5)	MACH 93 Advanced Machine Tools (5)
	MACH 116 Machine Tools (2)

Welding Technology Certificate (See Welding Flyer for details)

CATALOG 2016-2017
(Revised 11/10/16)

Machine Technology - Level II Certificate

The **Machine Technology - Level II Certificate** Program requires the completion of 31-34 units of which 22-25 units are in required courses. An additional 9 units must be chosen from the restricted electives listed below. A minimum grade of "C" is required in each course taken. At least one half of the units toward the certificate must be completed at Fullerton College.

Required Courses (22-25 units)	Restricted Electives (9 units)
DRAF 70 Blueprint Reading for Metal Trades (2)	DRAF 171 Fundamentals of Drafting (2)
DRAF 173 Geometric Dimen. & Tolerancing (2)	MACH 10 Machine Skills Lab (.5-2)
MACH 86 CNC Machine Set-up & Operation (3)	MACH 40 CNC Wire EDM Prog.& Operations (3)
MACH 91 Introduction to Machine Tools (5) or	MACH 88 Advanced CNC Machining (3)
MACH 116 Machine Tools (2)	METL 192 Fundamentals of Metallurgy (3)
MACH 92 Intermediate Machine Tools (5)	TECH 108 Manufacturing Processes (3)
MACH 93 Advanced Machine Tools (5)	TECH 127 Industrial Safety (1)
TECH 81 Technical Mathematics I (3)	WELD 121A Introduction to Welding (2)

Computer Numerical Control (CNC) Certificate

The **Computer Numerical Control (CNC) Certificate** Program requires the completion of 41-44 units of which 32-35 units are in required courses. An additional 9 units must be chosen from the restricted electives listed below. A minimum grade of "C" is required in each course taken. At least one half of the units toward the certificate must be completed at Fullerton College.

Required Courses (32-35 units)	Restricted Electives (9 units)
DRAF 70 Blueprint Reading for Metal Trades (2)	MACH 40 CNC Wire EDM Programs & Operations (3)
DRAF 140 AutoCAD for Industry (2)	MACH 88 Adv. CNC Machining (3)
DRAF 173 Geometric Dimen. & Tolerancing (2)	MACH 92 Intermediate Machine Tools (5)
MACH 50 CNC Programming using Mastercam (3)	TECH 88 Technical Science (3)
MACH 60 CNC Programming using Surfcam (3)	TECH 127 Industrial Safety (1)
MACH 52 Advanced CNC Programming using Mastercam (3) or	WELD 121A Introduction to Welding (2)
MACH 62 Advanced CNC Prog. using Surfcam (3)	
MACH 86 CNC Machine Set-up & Operation (3)	
MACH 87 CNC Parts Programming (3)	
MACH 91 Introduction to Machine Tools (5) or	
MACH 116 Machine Tools (2)	
METL 192 Fundamentals of Metallurgy (3)	
TECH 81 Technical Mathematics I (3)	
TECH 108 Manufacturing Processes (3)	

CNC Operator Skills Certificate

The **CNC Operator Skills Certificate** program requires a total of 14 units of which 14 units are in required courses with a minimum grade of "C" in each course taken. At least one-half of the units toward the certificate must be completed at Fullerton College.

Required Courses (14 units)	
MACH 86 CNC Machine Set-up and Operation (3)	MACH 88 Advanced CNC Set-Up & Operations (3)
MACH 87 CNC Parts Programming (3)	MACH 91 Introduction to Machine Tools (5)

WELDING TECHNOLOGY

PROGRAM INFORMATION

The Manufacturing Technology Department at Fullerton College provides students with a variety of programs in welding, machining, drafting, CAD, CAM, and robotics. These courses are taught by instructors with real world experience and current industrial certification. Classes provide students with experience necessary to be successful in manufacturing related jobs.

PROGRAM OPTIONS

- Vocational certificate offered in Welding
- Associate of Science Degrees are available in Manufacturing Technology.
- Skill upgrading and retraining by taking specific classes of interest.
- AWS and L.A. City Certification training and testing.

CAREER OPPORTUNITIES

The program in Welding Technology leads to employment in a wide variety of job descriptions in such areas as manufacturing, construction, medical, petrochemical, and aerospace industries.

SPECIAL FEATURES

- The Fullerton College Welding Department maintains modern laboratories to provide "hands-on" experiences over countless industrial welding processes.
- L.A. City Certified Testing Lab.
- All instructors are AWS/CWI certified.

FULLERTON COLLEGE
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(714) 992-7151
http://www.fullerton.edu

revised 1/12/17

WELDING TECHNOLOGY

FULLERTON COLLEGE

A Place to Discover Yourself,
A Place to Grow

Fullerton College can provide you with the education you'll need to succeed both personally and professionally in today's complex society.

Whether you are interested in college transfer or vocational training, in gaining new skills or upgrading current ones - whatever your need, at Fullerton College you will have the opportunity to prepare for tomorrow's world, for life!

FULLERTON COLLEGE

Welding Technology Certificate

The **Welding Technology Certificate** program requires the completion of not less than **24 units** of which **19 units** are in required courses. An additional **5 units** must be chosen from the restricted electives listed below. A minimum grade of "C" is required in each course taken. At least one half of the units toward the certificate must be completed at Fullerton College.

Required Courses (19 units)	**Restricted Electives (5 units)**
WELD 91A Industrial Welding Fund. (5) **or**	DRAF 70 Blueprint Rd. for Metal Trades (2)
WELD 121A Introduction to Welding (2) **and**	DRAF 171 Fundamentals of Drafting (2)
WELD 121B Fund. of Inert Gas Welding (2)	MACH 116 Machine Tools (2)
WELD 91B Semi-Auto. Welding App. (5)	METL 192 Fundamentals of Metallurgy (3)
WELD 91C Manual Arc Weld. Fund. (5)	TECH 81 Technical Mathematics I (3)
WELD 91D Structural Welding Cert. (5)	TECH 108 Manufacturing Processes (3)
	TECH 127 Industrial Safety (1)

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Routing & Response Page

Originator → IMS → Appropriate President's Staff Member → Program Review Chair

Originator

Electronically submit completed Program Review to Division Dean/IMS for review.

Appropriate Immediate Management Supervisor (IMS)

RESPONSE

Printed name of IMS	Title	Date

Select one and provide response if necessary. Forward electronically to appropriate Vice President's Office.

☐ *I concur with the findings contained in this Program Review.*

☐ *I concur with the findings contained in this Program Review with the following exceptions (include a narrative explaining the basis for each exception):*

Area of exception:

_____

_____

☐ *I do not concur with the findings contained in this Program Review (include a narrative explanation):*

_____

_____

Appropriate President's Staff Member

Acknowledging Receipt

Printed Name	Signature	Title	Date

Print Program Review, sign, and route both hard copy and electronic version to Program Review Chair.

Fullerton College Mission Statement

MISSION

Fullerton College advances student learning and achievement by developing flexible pathways for students from our diverse communities who seek educational and career growth, certificates, associate degrees, and transfer. We foster a supportive and inclusive environment for students to be successful learners, responsible leaders, and engaged community members.

VISION

Fullerton College will transform lives and inspire positive change in the world.

Approved by Fullerton College President's Advisory Council and accepted by President Schulz May 2017.

VALUES

Community
We promote a sense of community that enhances the well-being of our campus and surrounding areas.

Diversity
We embrace and value the diversity of our entire community.

Equity
We commit to equity for all we serve.

Excellence
We honor and build upon our tradition of excellence.

Growth
We expect everyone to continue growing and learning.

Inclusivity
We support the involvement of all in the decision-making process.

Innovation
We support innovation in teaching and learning.

Integrity
We act in accordance with personal integrity and high ethical standards.

Partnership
We work together with our educational and community partners.

Respect
We support an environment of mutual respect and trust that embraces the individuality of all.

Responsibility
We accept our responsibility for the betterment of the world around us.