

# Machining PUR Self Study 2022-23

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## Manufacturing Tool Technology:

Date: 09-15-2023

- Manufacturing Technologies - Machining 2022-23 PUR Self-Study

Sorted by: Program

**SI Section Templates:** 1.A. Program or Unit Description, 1.B. Program or Unit Mission, 1.C. Program Learning Outcomes, 2.A. Progress on Previous Findings and Recommendations, 2.B. Workforce Needs (AAS degrees and certificates; allied health programs only), 2.C. Accessibility and Cost of Instructional Materials, 2.D. Catalog Review, 3.B. Evidence of Program Learning Outcomes Assessment, 3.C. General Education Outcomes Assessment (if applicable), 3A. Curriculum Mapping, 4.A. FTE and Section Count, 4.B. Course Fill Rates and Unsuccessful Enrollment Attempts, 4.C. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, and Age Range, 5.A. Course Completion Rates, 5.B. Graduation and Transfer, 6. A. Faculty Achievement, 6.B. FT/PT Faculty and Student Credit Hours Taught, 6.C. Support Staff, 6.D. Facilities and Technology, 7.A. Five-Year Plan, 8.A. Resource Requests, Academic Standards and Assessment Committee Findings and Recommendations, Dean's Findings and Recommendations, Vice President of Academic Affairs' Findings and Recommendations

## Manufacturing Tool Technology

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### 1.A. Program or Unit Description

#### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Briefly describe (1 paragraph) the program/unit, including but not limited to the following: academic division that the program/unit belongs to, the academic area(s) represented, degrees/certificates offered, average student enrollment, number of full-time faculty, type of curriculum or pedagogical approaches, and any other pertinent aspect of the program/unit.**

The Manufacturing Technologies Unit of Truckee Meadows Community College was created to aid in the growth and development of northern Nevada's workforce by providing quality education to those seeking to begin or advance their career in manufacturing. Individual unit programs consist of general education courses, emphasis specific technical courses which provide students with the knowledge and skills needed to be successful in today's high-tech workplace.

The Manufacturing Technologies Unit is a member of the Applied Industrial Technologies Department (AIT) of Truckee Meadows Community College's School

of Science. The AIT department is headquartered at the Edison campus Pennington Applied Technology Center. The major programs and areas of study within the Manufacturing Technologies Unit are Advanced Manufacturing, Architecture, Machining, and Welding.

### 1.B. Program or Unit Mission

#### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**State the department's or unit's mission. Describe how it aligns to the College's Mission, and how program learning outcomes (PLOs) for degrees and certificates offered, or for the unit, align to the department/unit mission. If your department or unit does not currently have a mission statement, please discuss among your colleagues and develop one.**

#### Mission Statement

To deliver thorough, industry-relevant curriculum and effective, student-centered instruction capable of providing students with the intellectual tools and physical skill-sets required to pursue successful employment, career advancement, and personal growth within manufacturing industries.

### 1.C. Program Learning Outcomes

#### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

<b>Program Learning Outcomes (PSLOs or PLOs)</b>
<b>Manufacturing Tool Technology</b>
<b>PSLO</b>
<b>Computer Numeric Controlled (CNC) Machining Certificate of Achievement</b>
PSLO 1: Read and interpret technical prints for the production and inspection of manufactured work pieces. (Active from Fall 2021)
PSLO 2: Produce precision machined work pieces within print specifications on computer numerical controlled (CNC) machine tools. (Active from Fall 2021)
<b>AAS Machining</b>
PSLO 1: Read and interpret technical prints for the production and inspection of manufactured work pieces. (Active from Fall 2021)

<b>Program Learning Outcomes (PSLOs or PLOs)</b>
PSLO 2: Produce precision machined work pieces within print specifications on manually controlled machine tools. (Active from Fall 2021)
PSLO 3: Produce precision machined work pieces within print specifications on computer numerical controlled (CNC) machine tools. (Active from Fall 2021)
<b>Machining Level 1-CNC Milling Operations and Programming Skills Certificate</b>
PSLO 1: Write ISO standard G-Code programs for CNC milling operations. (Active from Fall 2021)
PSLO 2: Set-up, operate, and produce a finished product using CNC milling equipment. (Active from Fall 2021)
PSLO 3: Employ appropriate workplace skills, including the application of personal and mechanical safety measures for CNC mill equipment. (Active from Fall 2021)
<b>Industrial Maintenance Certificate of Achievement</b>
PSLO 1: Learn hands-on technical skills in the areas for Electrical controls, Welding and Manual Machining. (Active from Fall 2021)
PSLO 3: Diagnose and troubleshoot electrical and mechanical systems. (Active from Fall 2021)
PSLO 3: Practice safety at all levels in a modern industrial environment. (Active from Fall 2021)
<b>AAS Production Systems</b>
PSLO 1: Read and interpret technical prints for inspection of manufactured and/or assembled products. (Active from Fall 2021)
PSLO 2: Manage complex production systems, equipment, and controls. (Active from Fall 2021)
PSLO 3: Apply quality and statistical process control techniques to complex production and distribution systems. (Active from Fall 2021)
<b>Industrial Electricity 1, Skills Certificate</b>
PSLO 1: Apply theory of electricity and it's application in various technical areas and use basic electronic measurement instruments for circuit troubleshooting. (Active from Fall 2021)
PSLO 2: Evaluate DC series and parallel circuits in component selections and circuit design and be able to demonstrate AC circuitry through simple experiments with tests equipment. (Active from Fall 2021)
PSLO 3: Apply relationships and mathematical calculations of voltage, ohms, amperes, three-phase voltage, and current to analyze basic electrical/electronic circuits. (Active from Fall 2021)
<b>Machining Level 1-CNC Turning Operations and Programming , Skills Certificate</b>
PSLO 1: Write ISO standard G-Code programs for CNC turning operations. (Active from Fall 2021)
PSLO 2: Set-up, operate, and produce a finished product using CNC lathe equipment. (Active from Fall 2021)
PSLO 3:Employ appropriate workplace skills, including the application of personal and mechanical safety measures for CNC lathe equipment. (Active from Fall 2021)

## 2.A. Progress on Previous Findings and Recommendations

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Describe your progress on the major findings and recommendations for the program/unit from the last PUR, any annual progress reports (APRs), and if applicable, external reviews, (e.g. advisory boards, articulation committees, and program accreditors).**

- **Which findings and recommendations have the program/unit addressed?**
- **Which have yet to be accomplished? Which are no longer relevant, and why?**
- **Has the program/unit undergone any major changes as a result or that would impact the findings and recommendations since the last PUR?**

1. Develop specific strategies to increase student diversity (females and Hispanic students) and graduation rates.

To help increase the female enrolments in the Manufacturing Technologies, TMCC Machining Program has participated in multiple woman's technology Expos (Building Women events) at the Edison Campus. The Machining Program has also hired female IA's to diversify staff presence in the machining lab. Efforts to increase both female and Hispanic enrollments and graduation rates have been developed through the integration of the Ace High School Machining Program and completion of the "Right Skills Now" program under round one and round three of the TAACCCT Grant.

Resulting female head count has risen from 12% to 13.1% and still reflects the industry's traditionally male workforce.

Resulting Hispanic head count has risen from 12% to 34.6%, and represents an increase that exceeds TMCC's general population.

2. Continue to assess courses as part of the proposed five-year schedule, including the development of meaningful and measurable learning outcomes for those courses not yet assessed. More assessment of courses in the different program areas is needed.

Continued course assessment efforts have resulted in significantly more courses being assessed in a timely manner. The Machining Program is current on its five-year assessment schedule.

3. Continue to press for facilities upgrades, especially those that affect safety.

The machining lab has received multiple facilities upgrades including a new heating system, new lighting, cooling improvements, installation of a hand washing station, installation of a permanent eye wash station, overhead wiring

expansion, overhead air line expansions, program display cases, and air system alarms.

This finding remains ongoing.

4. Address resources needed for the three externally driven initiatives.

The resources necessary to complete machining's initiatives were met primarily through a combination of TAACT grant funding and the extensive cooperation of the TMCC Facilities Department. Machining Program faculty provided the required time and manpower required to develop and implement the initiatives.

All externally driven initiatives have been completed.

A modified ibest model that includes the imbedding of mathematics was completed in 2015.

The Right Skills Now cohort model was built in 2012-2013 and offered successfully through 2015. The model remains in place and awaits further industry demand.

The Machine Shop Lab has been upgraded with the purchase of 5 new CNC machines and 18 new manual machine tools. See section 6d for a complete list of upgraded equipment.

The TMCC Facilities Department oversaw the expansion of our primary classroom and the construction of a new inspection room required to safely run all sections of the Right Skills Now accelerated program.

5. Search out additional resources to acquire new equipment.

The Machining Program has been able, through grants and donations, to upgrade the entire machining lab with new equipment in all areas of instruction. See 6d

## **2.B. Workforce Needs (AAS degrees and certificates; allied health programs only)**

### **Manufacturing Technologies - Machining 2022-23 PUR Self-Study**

**Describe how your program(s) is/are meeting workforce needs, especially in the Northern Nevada region, by answering the accompanying questions. The following are potential resources for labor market data, though other sources may be referenced.**  
**Nevada Department of Employment Training and Rehabilitation (DETR) (<https://detr.nv.gov/>)**

**Economic Development Authority of Western Nevada (EDAWN)**  
 (<http://edawn.org/>)  
**U.S. Bureau of Labor Statistics** (<http://www.bls.gov/>)

- **What is the evidence for the regional need for the program (DETR and EDAWN data)?**
- **What is the evidence that program curriculum meets the latest industry trends or workforce needs?**

DETR Industry and Occupational Projections for machinists show strong demand and continued growth, both short term and long term, with a projected job growth rate of 10% short term and 22% long term.

Home		Industry ▾		Wage ▾		Occupation ▾		Employment/Unemployment ▾	
State	Region	Area Type	Area	Period	Indu.				
Nevada	NV	State	Nevada	(All)	NAI				
Occupation Type	Occupation Level	Occupation							
(All)	(All)	(Multiple values)							
Area	Period	Industry Code & Title	Occupation Code & Title	Base Year Employment	Projected Employment	Numeric Change	% Change		
Nevada	NV 2021-2023 Short Term Projections	000000 - Total, All Industries	514000 - Metal Workers and Plastic Workers	7,010	7,650	640	9.13%		
Nevada	NV 2021-2023 Short Term Projections	000000 - Total, All Industries	514034 - Lathe & Turning Machine Tool Setters, Operators, &	31	32	1	3.23%		
Nevada	NV 2021-2023 Short Term Projections	000000 - Total, All Industries	514035 - Milling & Planing Machine Setters, Operators, & Te	45	46	1	2.22%		
Nevada	NV 2021-2023 Short Term Projections	000000 - Total, All Industries	514041 - Machinists	1,025	1,089	64	6.24%		
Nevada	NV 2020-2030 Long Term Projections	000000 - Total, All Industries	514000 - Metal Workers and Plastic Workers	6,743	7,437	694	10.29%		
Nevada	NV 2020-2030 Long Term Projections	000000 - Total, All Industries	514034 - Lathe and Turning Machine Tool Setters, Operators,	31	28	-3	-9.68%		
Nevada	NV 2020-2030 Long Term Projections	000000 - Total, All Industries	514035 - Milling and Planing Machine Setters, Operators, an	53	50	-3	-5.66%		
Nevada	NV 2020-2030 Long Term Projections	000000 - Total, All Industries	514041 - Machinists	1,025	1,137	112	10.93%		
Nevada	NV 2020-2022 Short Term Projections	000000 - Total, All Industries	514000 - Metal Workers and Plastic Workers	8,572	8,848	276	3.22%		
Nevada	NV 2020-2022 Short Term Projections	000000 - Total, All Industries	514041 - Machinists	790	854	64	8.10%		
Nevada	NV 2018-2028 Long-Term Projections	000000 - Total, All Industries	514000 - Metal Workers and Plastic Workers	8,652	10,498	1,846	21.34%		
Nevada	NV 2018-2028 Long-Term Projections	000000 - Total, All Industries	514035 - Milling & Planing Machine Setters, Operators, & Te	21	20	-1	-4.76%		
Nevada	NV 2018-2028 Long-Term Projections	000000 - Total, All Industries	514041 - Machinists	809	988	179	22.13%		

**2.C. Accessibility and Cost of Instructional Materials**

**Manufacturing Technologies - Machining 2022-23 PUR Self-Study**

- **What are faculty in the department/unit currently doing or planning to help ensure that instructional materials are accessible to students with disabilities? Examples include attending Professional Development accessibility sessions, running accessibility checkers on materials, and completing the “Creating Accessible Content” workshop.**

- **What are faculty in the department/unit currently doing or planning to offer affordable instructional materials to students? Examples would include internal development of educational materials or utilization of open educational resources (OER).**

- The MTT 230 and MTT 232 courses use OER resources from HAAS (CNC Lathe and CNC Mill Programming Workbooks) All are accessible on CANVAS.
- The ACE High School program uses high school bought textbooks for MTT 105, MTT 250, and DFT 110
- MTT 101, MTT 105, MTT 110, MTT 250, and MTT 260 all use the same textbook.
- The Machining Program has begun the process of creating and employing an accessibility checking plan by which all machining course content can be reviewed and corrected if needed.

## 2.D. Catalog Review

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

- **Is the program information in the catalog correct, including descriptions, PLOs, course descriptions, and course offerings, accurate?**
- **Does the program's suggested course sequence in the catalog allow for completion of degrees within 2 years and/or certificates within 2 semesters for full-time students?**
- **Are there any courses that the department has not offered in 4 or more years? Please indicate whether you plan to update and offer, or deactivate the(se) course(s) in the next academic year.**

All TMCC College Catalog Machining Program information and content is current and up to date as the program currently exists. New courses have been or are under development this academic year they will require changes to both the program and the catalog. The suggested course sequence allows for full time students to complete within guidelines for AAS degrees and COAs. All Machining

Program (MTT) course catalog classes have been offered within the last 4 years and there are no plans to deactivate any MTT course at this time. Changes described below will impact future course and program offerings.

### **3.B. Evidence of Program Learning Outcomes Assessment**

#### **Manufacturing Technologies - Machining 2022-23 PUR Self-Study**

**Summarize the most significant program assessment results since your last PUR. These will come from past CARS, APRs, and Action Plans and assessment data within eLumen. Please discuss course assessment findings as they apply to the program and program learning outcomes.**

Overall assessment data shows that all learning outcomes are being met at or above proficient levels, though room for improvement exists in nearly all courses assessed. Significant findings include the need for a streamlined assessment project within some project oriented classes. This would simplify the assessment process and yield better data in some cases. We also identified some issues with student math skills that were hampering high level performance on a number of outcomes. It was also noted that limited access to lab equipment is playing a role in reaching the highest level of achievement for some students on competency based outcomes in the manual and CNC machining courses.

**Describe how department faculty implemented plans to improve students' achievement of program learning outcomes. What changes did you make to the program based on assessment results and improvement plans?**

Department faculty have closed the loop by putting in place more homework assignments and canvas activities that place a higher emphasis on the math skills required for proficiency on both mathematical and non-mathematical outcomes. The department is in the process of developing video content centered on instructor lead demonstrations of program mathematical concepts and key machining processes in order to achieve greater competency through repetition.



A comprehensive assessment project is under development for each of the four Machine Shop courses (I-IV) and will be implemented during the 2023-2024 academic year.

The department has initiated resource requests to add additional lab equipment for those courses that demonstrated access issues impacting student learning. Replacement digital readout scales and reader heads have been requested and received. These replacements are currently being installed on defective equipment and are already improving outcomes.

### **3.C. General Education Outcomes Assessment (if applicable)**

#### **Manufacturing Technologies - Machining 2022-23 PUR Self-Study**

- **Describe which general education learning outcomes (GELOs) you assessed in your department/unit and summarize the most significant assessment results.**
- **Describe how department faculty implemented plans to improve students' achievement of GE learning outcomes. What changes did you make to general education based on assessment results and improvement plans? Do any CLOs need to be changed to align with GELOs?**

General education outcomes assessment are not applicable within the TMCC Machining Program.

### **3A. Curriculum Mapping**

#### **Manufacturing Technologies - Machining 2022-23 PUR Self-Study**



**Please analyze the following. Remember to paste a copy of your curriculum map.**

- **PLOs: Do all PLOs reflect what you want students to demonstrate once they complete the program? Are there any PLOs that need to be updated?**

- **Potential gaps and redundancies: Are there any PLOs that are not addressed in the curriculum? Are there any unwanted redundancies of PLOs in the curriculum?**

- **CLO alignment: Is there a need to modify any course learning outcomes so that courses better support PLOs?**

- **Course sequencing: Is there a need to modify the course sequencing so that learning is scaffolded throughout the program? In other words, courses taken earlier in the program sequence should introduce PLOs, and courses taken later in the sequence should reinforce PLOs by offering students additional opportunities to practice.**

- **Curriculum and learning opportunities: Is it necessary to introduce new learning opportunities to reinforce learning in specific courses? These could be modules or assignments in courses, additional courses, and/or co-curricular opportunities that would be required of all students in the program.**

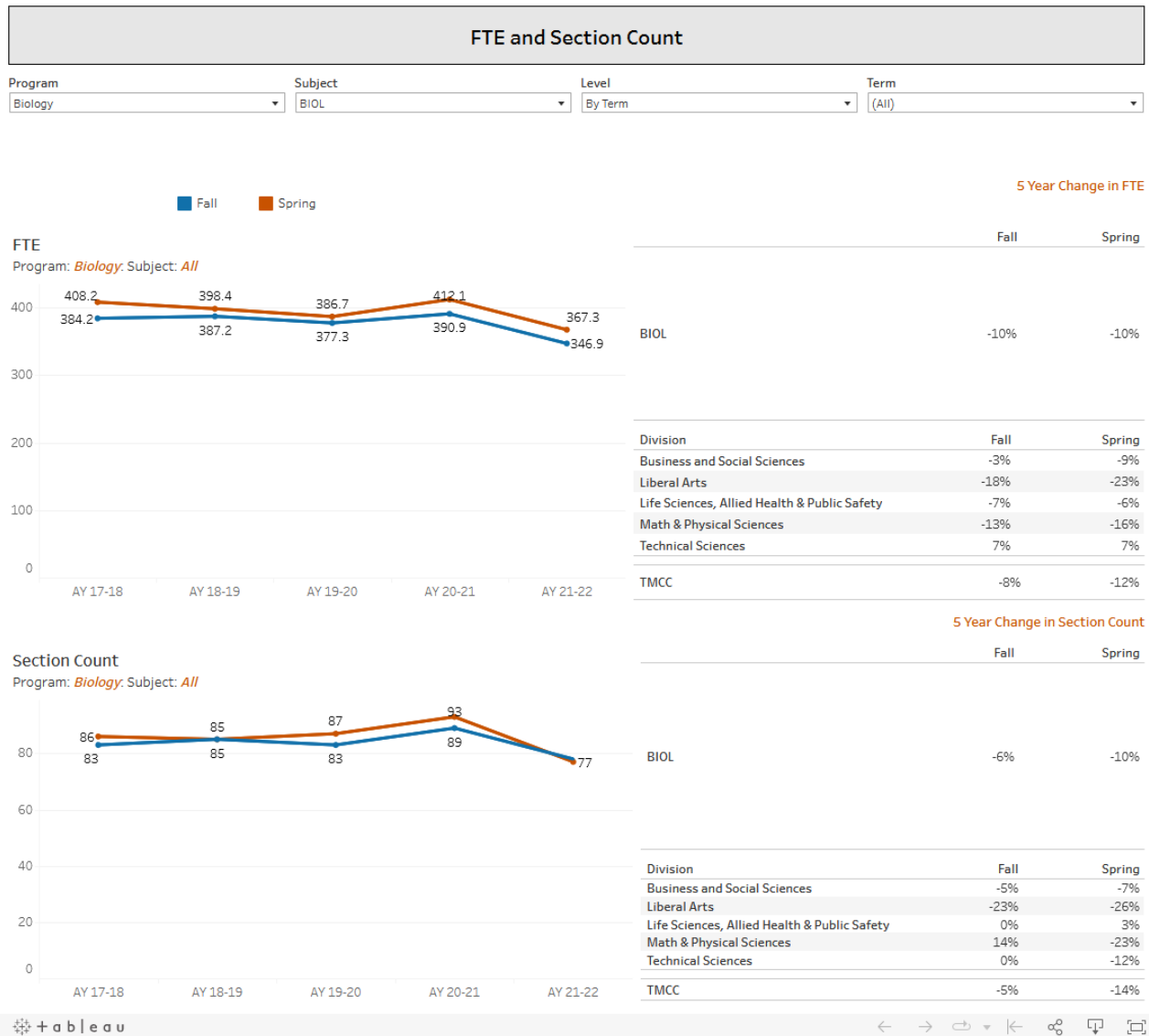
- **Do you need to make any changes to the curriculum map after this analysis?**

- **Other?**

Machining Program curriculum mapping was completed at the end of the spring 2022 semester and required an extensive review of both course and program outcomes and measures. During our review no discrepancies were noted. Intentional duplication of some outcomes is utilized in order to provide continued reinforcement of important outcomes.

#### **4.A. FTE and Section Count**

**Manufacturing Technologies - Machining 2022-23 PUR Self-Study**



**Please analyze the trends in FTE and course section counts. Discuss what these trends suggest about the viability of program enrollment.**

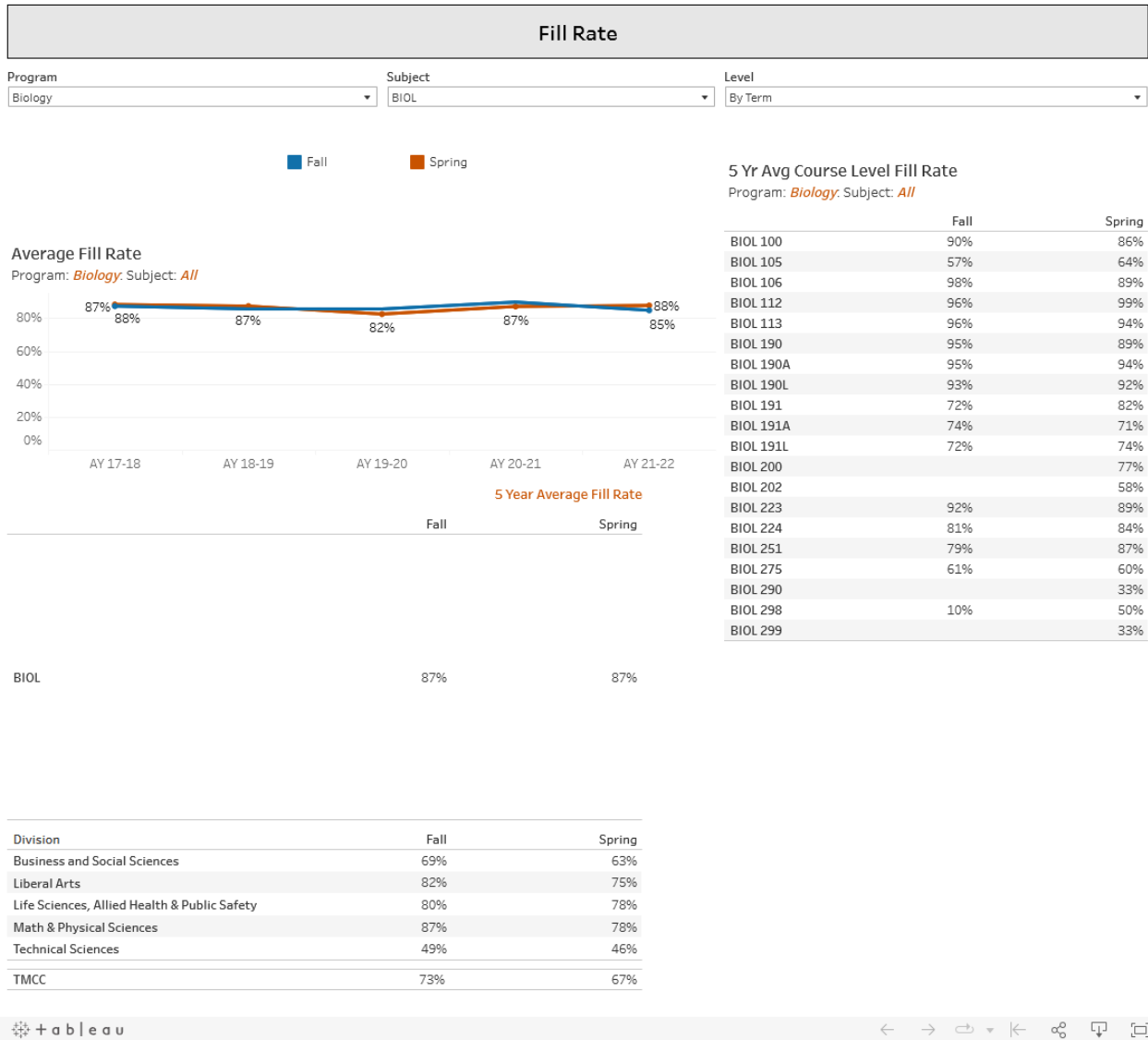
Overall program FTE and section count have remained fairly consistent for the past 5 years with a slight decrease in FTE attributed to the lingering impact of the COVID-19 pandemic. Prior to the pandemic FTE was on a slow upward trend supporting program viability.

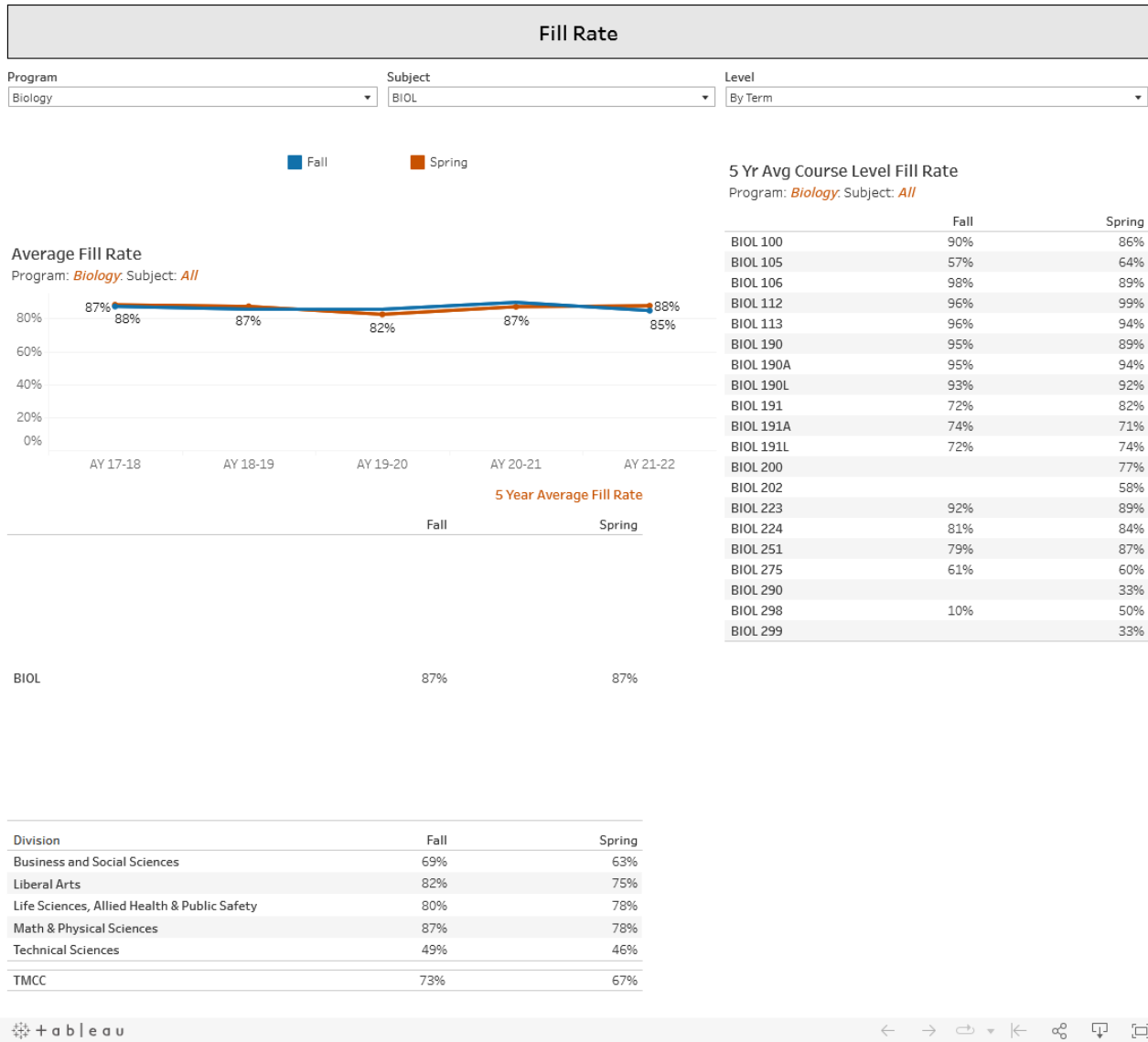
The Machining Program section count remained consistent primarily due to the unique and non-traditional delivery methods employed within the program. The program operates in a traditional/open-entry hybrid model in which lower division courses are offered in an open-entry/open-exit format while upper

division courses are offered in traditional format. Consequently, only one section of each course is offered per semester with the exception of the open-entry sections which are duplicated to provide a separate section specifically for veterans who are using their GI bill benefits to further their education. This separate veterans' section is required in order to meet the unique requirements of the veterans' financial aid program and would otherwise not be required as veterans could be absorbed into the regular college section. These veterans' sections skew the section count higher than it otherwise would be.

### 4.B. Course Fill Rates and Unsuccessful Enrollment Attempts

#### Manufacturing Technologies - Machining 2022-23 PUR Self-Study





**Please analyze the trends in course fill rates and unsuccessful enrollment attempts. Discuss what these trends suggest about meeting student demand.**

Course fill rates for the Machining Program traditional course offerings are trending higher than the Division as a whole and lower than TMCC’s average. This is in part due to the emphasis placed on setting course caps primarily based on room capacity. While this may work well for many TMCC programs it does create challenges within the Machining Program. All of the traditional course offerings require lab components. Higher course caps result in limited student access to lab equipment and less hands-on training per student from both a safety and logistical standpoint. Course assessment is beginning to bear this out. Additional lab equipment would alleviate some but not all of the problem as instructor supervision is required from a safety perspective. Reduced section caps may be

required in conjunction with additional lab equipment to improve student learning outcomes. Fill rates for open-entry courses are largely impacted by the requirement to duplicate sections in order to accommodate veterans using their financial aid programs. For example, 2 sections of each course are offered. 1 section for veterans and another for everyone else. If both sections are capped at 10 students each and 8 students enroll in the everyone else section and 1 veteran in the veteran's section, instead of 1 section with a 90% fill rate we end up with 1 section with a fill rate of 80% and the other with a fill rate of only 10%. This results in a significantly lower overall fill rate average than if we offered only the 1 section. Unfortunately, financial aid requirements prevent us from offering only the 1 section we would like to.

Unsuccessful enrollment attempts for courses within the Machining Program are low compared with both the Division and TMCC as a whole. This indicates students are able to get the courses they need, when they need them.

#### **4.C. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, and Age Range**

##### **Manufacturing Technologies - Machining 2022-23 PUR Self-Study**

Demographics for Machining Program enrollments for nearly all categories either mirror the college as a whole or show slight improvements in general. The only outlying category is the female to male enrollment ratio. This is primarily because the manufacturing industry remains a continually male dominated industry.

To help increase the female enrollments in the Manufacturing Technologies, TMCC Machining Program has participated in multiple woman's technology Expos (Building Women events) at the Edison Campus. The Machining Program has also hired female IA's to diversify staff presence in the machining lab. Efforts to increase female enrollments and graduation rates have been developed through the integration of the Ace High School Machining Program and completion of the "Right Skills Now" program under round one and round three of the TAACCCT Grant.

Resulting female head count has risen from 12% to 13.1% and still reflects the industry's traditionally male workforce.

### Demographics: Enrollments

Program  
Machining and Manufacturing Technologies

Subject  
MTT

This section shows the demographics of the students who have taken a subject in your program.

#### Headcount of Subject Takers

Program: *Machining and Manufacturing Technologies*; Subject: *MTT*

Subject	Fall 17	Fall 21	5 Yr Change
MTT	98	107	9%

#### TMCC Headcount

Institution	Fall 17	Fall 21	5 Yr Change
TMCC	11110	9923	-11%

Term: Fall | Demographics: by Ethnicity

#### Subject Takers by Ethnicity

Term: *Fall* Program: *Machining and Manufacturing Technologies*; Subject: *All*

Selected Granularity	Fall 17	Fall 18	Fall 19	Fall 20	Fall 21
American Indian	2.0%		2.5%	2.0%	1.9%
Asian	4.1%	3.7%	2.5%		1.9%
Black	2.0%	0.9%	0.8%	2.0%	0.9%
Hispanic	18.4%	27.8%	25.8%	25.3%	34.6%
Caucasian	65.3%	63.9%	64.2%	65.7%	52.3%
Two or more races	5.1%	2.8%	1.7%	2.0%	0.9%
Unknown	3.1%	0.9%	2.5%	3.0%	7.5%

#### TMCC by Ethnicity

Term: *Fall*

	Fall 17	Fall 18	Fall 19	Fall 20	Fall 21
International	0.4%	0.4%	0.3%	0.4%	0.5%
American Indian	1.3%	1.3%	1.0%	1.0%	1.3%
Asian	6.0%	5.9%	5.8%	6.5%	6.1%
Black	2.5%	2.6%	2.8%	2.8%	2.5%
Hawaiian or Pacific Islander	0.0%	0.0%	0.1%	0.1%	0.1%
Hispanic	28.8%	29.9%	32.3%	31.1%	33.6%
Caucasian	55.7%	54.1%	51.7%	51.5%	49.6%
Two or more races	3.5%	3.7%	4.2%	4.7%	4.3%
Unknown	1.7%	1.9%	1.7%	1.9%	2.1%

**Briefly describe the typical student profile in terms of ethnicity, gender, credit load, student status, and age range in your program/unit, including how they compare to demographics of the college. Please note any potentially underserved student populations and discuss ideas for closing potential equity gaps. An equity gap is where there is a significant and persistent disparity in access or achievement between different groups of students.**

**Does the program’s teaching staff look like its student population?**



**If not, discuss ideas for how faculty can use more inclusive teaching methods.**

Program staff represent a generally accurate picture of our student population. Staffing includes both male and female instructors and IA's, Hispanics, and members of LGBTQ community. Staff ages range from the low 20's through the 60's and 70's and mirrors that of our student population.

**5.A. Course Completion Rates****Manufacturing Technologies - Machining 2022-23 PUR Self-Study**

**Please describe any substantial trends or shifts that you see in the overall course completion rate and successful completion (C or better). What might these trends or shifts mean? Next, disaggregate the data by student demographics. Discuss any potential equity gaps and ideas for closing these gaps. An educational equity gap is where there is a significant and persistent disparity in educational attainment between different groups of students.**

Course completion rates and successful completion rates for the Machining Program trend slightly higher than both the Division and the college as a whole. Review of demographics revealed no educational equity gaps could be identified that could not be directly tied to TMCC's emergency pandemic extended closure.

### Outcomes: Course Completion Rates

Program: Machining and Manufacturing Technologies
 Subject: MTT
 Level: by Academic Year

The tables below show the percent of students completing your courses. These numbers are compared to all divisions and to TMCC as a whole. The metrics can be disaggregated by the demographics below.

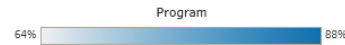
**Completion Rate:** The number of students who remain in a class until the end of the semester and receive A, B, C, D, Pass (P), Satisfactory (S), In Progress (X), Incomplete (I) or Audit (AD) grade notations.

**Successful Completion:** The number of students who completed a course with a C or better (A, B, C).

Gender: (All)
 Ethnicity: (All)
 Credit Load: (All)
 Age Range: (All)
 Student Status: (All)
 First Generation: (All)
 Pell Eligible: (All)

#### Avg Completion & Successful Completion Rates by Subject

Program: *Machining and Manufacturing Technologies* Subject: *MTT*



Subject	AY 17-18 AY	AY 18-19 AY	AY 19-20 AY	AY 20-21 AY	AY 21-22 AY	5 yr Avg
MTT Completion Rate	82%	83%	86%	82%	88%	84%
Successful Completion	76%	80%	64%	77%	81%	75%

#### 5 Yr Avg Completion & Successful Completion Rates by Division



	Business & Social Sciences	Liberal Arts	Life Sciences, Allied Health & Public Safety	Math & Physical Sciences	Technical Sciences	TMCC
Completion Rate	80%	78%	86%	70%	82%	79%
Successful Completion	72%	70%	76%	54%	75%	69%

**Outcomes: Awards & Transfer**

**Program**  
 Machining and Manufacturing Technologies

This section shows the number of degrees your program has awarded over the past 5 years. A second bar chart shows the rate at which students who graduate from your program transfer to other institutions.

Gender: (All) | 
 Ethnicity: (All) | 
 Credit Load: (All) | 
 Age Range: (All) | 
 First Generation: (All) | 
 Pell Eligible: (All)

**Awards**

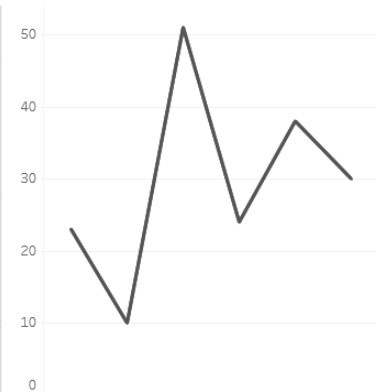
Program: *Machining and Manufacturing Technologies*

Program 1  32

		AY 17-18	AY 18-19	AY 19-20	AY 20-21	AY 21-22	Total Awards
Degrees	CNC-CT	1	12	8	8	8	37
	MACHNG-AAS	2	2	3	3	5	15
Skills Certificates	CNCMIL	3	5	3	10	5	26
	CNCTUR	4	32	10	17	12	75
<b>Total Awards</b>		<b>10</b>	<b>51</b>	<b>24</b>	<b>38</b>	<b>30</b>	<b>153</b>

**Program Award Trend**

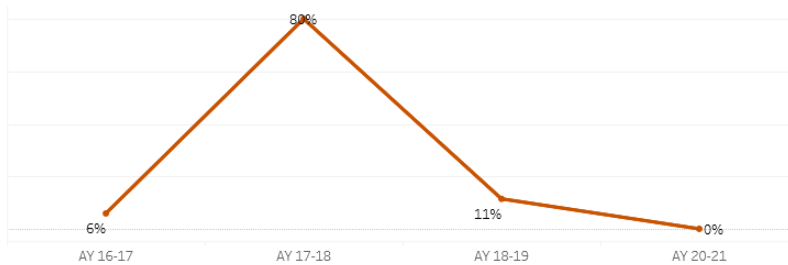
Program: *Machining and Manufacturing Technologies*



**Transfer Rate of Graduates**

Program: *Machining and Manufacturing Technologies*

Degree Type  
■ Terminal



**Transfer Schools**

Program: *Machining and Manufacturing Technologies*

	# of Transfer Graduates	% of Transferred Graduates
NSHE	8	67%
Non-NSHE	4	33%
<b>Total Transfer Graduates</b>	<b>12</b>	<b>100%</b>

## 5.B. Graduation and Transfer

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Outcomes: Awards & Transfer**

**Program**  
 Machining and Manufacturing Technologies

This section shows the number of degrees your program has awarded over the past 5 years. A second bar chart shows the rate at which students who graduate from your program transfer to other institutions.

Gender: (All) | Ethnicity: (All) | Credit Load: (All) | Age Range: (All) | First Generation: (All) | Pell Eligible: (All)

**Awards**  
Program: *Machining and Manufacturing Technologies*

		AY 17-18	AY 18-19	AY 19-20	AY 20-21	AY 21-22	Total Awards
Degrees	CNC-CT	1	12	8	8	8	37
	MACHNG-AAS	2	2	3	3	5	15
Skills Certificates	CNCMIL	3	5	3	10	5	26
	CNCTUR	4	32	10	17	12	75
<b>Total Awards</b>		<b>10</b>	<b>51</b>	<b>24</b>	<b>38</b>	<b>30</b>	<b>153</b>

**Program Award Trend**  
Program: *Machining and Manufacturing Technologies*

**Transfer Rate of Graduates**  
Program: *Machining and Manufacturing Technologies*

**Transfer Schools**  
Program: *Machining and Manufacturing Technologies*

	# of Transfer Graduates	% of Transferred Graduates
NSHE	8	67%
Non-NSHE	4	33%
<b>Total Transfer Graduates</b>	<b>12</b>	<b>100%</b>

**Please discuss any trends or shifts that you see in the number of graduates and graduates who have transferred in the past 5 years.**

**Next, disaggregate the data by student demographics, and discuss any potential equity gaps: Which student populations are earning degrees or certificates compared to the demographic makeup of the program? Do graduates resemble the student demographics of the program? If not, discuss ideas to mitigate potential equity gaps.**

The Machining graduation rates rose between AY 17-18 and AY 18-19, but dropped off during the Pandemic. Graduation rates have begun to rise after the pandemic and the rates are higher than the AY

17-18 term. The AAS Machining Degree is a terminal degree, so transfer rates are not applicable.

## 6.A. Faculty Achievement

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Describe the program/unit's full-time (FT) faculty credentials, experience, and highlights of significant activities and/or contributions to TMCC. Please use the format below for each FT faculty member.**

- **Faculty Name, FTE**
- **Degree(s) or professional certification(s) awarded, discipline, awarding institution**
- **Substantial accomplishments or contributions to the community, especially those related to education or your discipline (e.g. mentoring, community service) (Please limit to 3)**
- **Number of years teaching at TMCC**
- **Total number of years in academia**
- **Primary courses taught**
- **Significant activities or contributions made to TMCC (Please limit to 3)**

LAURE'L SANTOS: Full-Time Professor at Truckee Meadows Community College. Hired 7/2017.

Laure'l is the coordinator and instructor for the dual credit Truckee Meadows Community College/Academy for Career Education Advanced Machining and Manufacturing Technologies Program.

#### DEGREES AWARDED:

- Truckee Meadows Community College, Reno, NV  
Associate of Applied Science  
Major: Manufacturing Technologies,  
Machining  
Graduated: Spring 2008

- Truckee Meadows Community College, Reno, NV  
Associate of Applied Science  
Major: Paralegal  
Graduated: Spring 2006
  
- University of Nevada Reno, Reno, NV  
Master of Arts in Counseling and Education Psychology with  
an  
emphasis on College Student Development.  
Graduated: Spring 2005
  
- University of Nevada Reno, Reno, NV  
Bachelor of General Studies  
Minor: Mining Engineering  
Minor: Museology  
Graduated: Fall 2000
  
- Awarded Tenure at TMCC, Spring 2020
- National Counselor Certification Fall, 2005
- Quality Matters Certification, 2014
- Forklift Operator Certification for TMCC
- National Institute for Metal Working Skills Certifications
  - Job Planning, Benchwork and Layout
  - Measurement, Materials and Safety
  - CNC Turning Operator
  - CNC Milling Operator

#### ACCOMPLISHMENTS AND CONTRIBUTIONS TO THE COMMUNITY:

- Skills USA Advisor, 2016 to present
- First Robotics Coach 2018-2021
- President, Reno Antique Engine and Tractor Association, Branch 167.

#### NUMBER OF YEARS TEACHING AT TMCC:

- Eight years full-time teaching experience at TMCC
  
- Five years part-time teaching experience TMCC

#### TOTAL YEARS IN ACADEMIA:

- Thirteen years in academia

#### PRIMARY COURSES TAUGHT:

- Machine Shop I (MTT 105)
- Machine Shop III (MTT 250)
- Machine Shop IV (MTT 260)
- Machine Projects (MTT 261)
- Computer Numerical Control I (MTT 230)
- Computer Numerical Control II (MTT 232)
- Print Reading for Industry (DFT 110)
- Quality Control (MPT 145)
- General Industry Safety (OSH 222)

#### SIGNIFICANT CONTRIBUTIONS TO TMCC

- Laure'l helped create the dual credit Truckee Meadows Community College/Academy for Career Education Advanced Machining and Manufacturing Technologies Program.

- Active Member of the TMCC Learning Commons Committee.

- Member of the Nevada Department of Education Standards Committee to develop the Manufacturing Technologies Standards for Nevada's Office of Career, Technical and Adult Education Metalworking Standards.

Kelly Oswald: Full-Time Professor at Truckee Meadows Community College. Hired 8/2005.

Associates of Applied Science - Machining Technology, Pikes Peak Community College, 2001

#### SIGNIFICANT CONTRIBUTIONS TO TMCC

- Established and oversaw the creation of the TMCC Machining Program.
- Developed the Machining Program Curriculum, Degree, Certificates, and Pathways.
  - Co-created, with Laure'l Santos, The A.C.E High School Machining Program.
  - Developed and implemented the nationally recognized TMCC Right Skills Now Program.
  - Developed and maintained cooperative industry partnerships.
  - Co-developed the TMCC apprenticeship Program.
  - NISOD award winner 2013-2014.

## 6.B. FT/PT Faculty and Student Credit Hours Taught

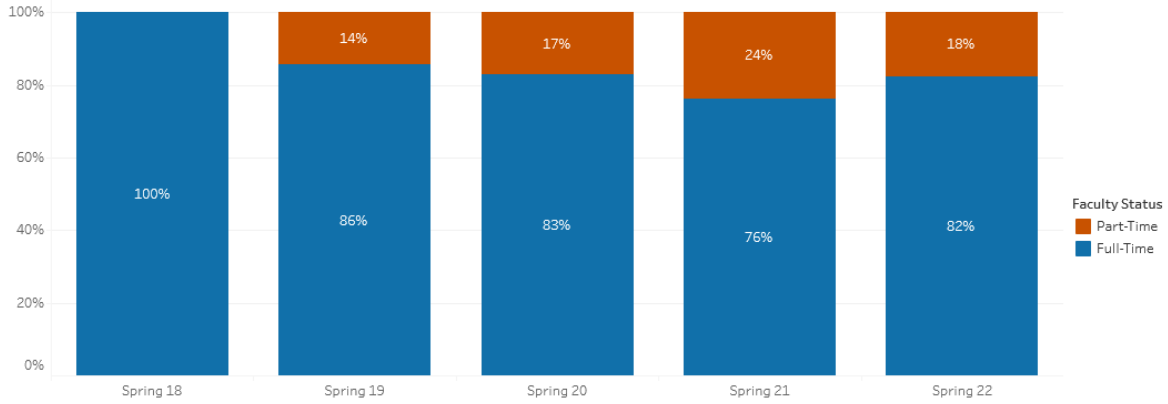
### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

### Faculty Workload

Program: Machining and Manufacturing Technologies
 Term: Spring

**Student Credit Hours**

Program: *Machining and Manufacturing Technologies*



*The above section shows the percent of student credit hours that were taught by Full-Time vs Part-Time faculty within your program's subject area. These student credit hours are not necessarily enrollments of your declared majors, they are enrollments by all students taking your courses. Student credit hours are defined as the sum of (enrolled students x units).*

**Headcount & FTE**

Program: *Machining and Manufacturing Technologies*

	Full-Time		Part-Time	
	Headcount	FTE	Headcount	FTE
Spring 18	2	4.1		
Spring 19	2	4.1	1	0.4
Spring 20	2	4.1	1	0.4
Spring 21	2	3.9	2	0.7
Spring 22	2	3.9	1	0.4

*The above section shows the headcount and the FTE (units / 15) of Full-Time vs Part-Time faculty who teach your courses. If the FTE of your FT faculty is larger than headcount, this means that the average teaching load of your FT faculty is greater than 15. If the FTE is lower than headcount, this is a reflection of the amount of release given to your FT faculty.*

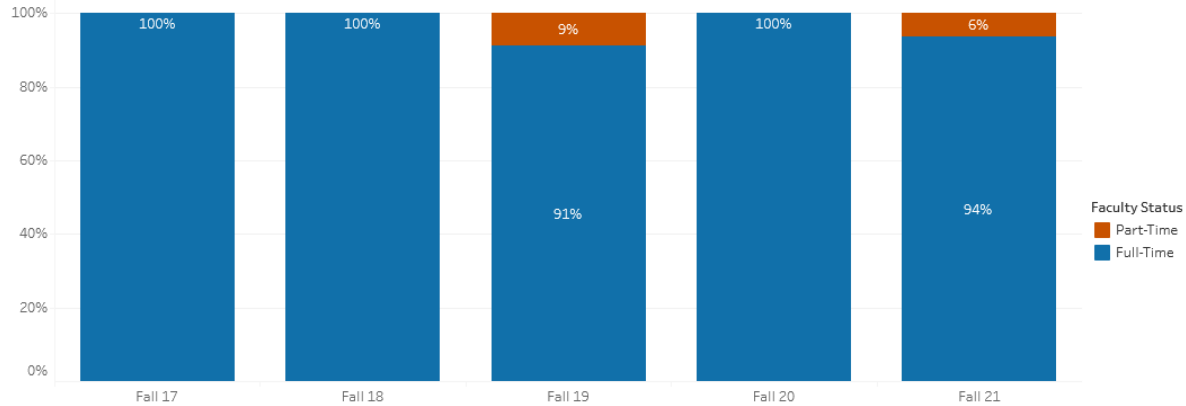


### Faculty Workload

Program: Machining and Manufacturing Technologies Term: Fall

**Student Credit Hours**

Program: *Machining and Manufacturing Technologies*



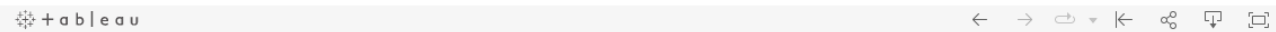
*The above section shows the percent of student credit hours that were taught by Full-Time vs Part-Time faculty within your program's subject area. These student credit hours are not necessarily enrollments of your declared majors, they are enrollments by all students taking your courses. Student credit hours are defined as the sum of (enrolled students x units).*

**Headcount & FTE**

Program: *Machining and Manufacturing Technologies*

	Full-Time		Part-Time	
	Headcount	FTE	Headcount	FTE
Fall 17	2	2.5		
Fall 18	2	3.8		
Fall 19	2	4.1	1	0.3
Fall 20	2	4.3		
Fall 21	2	4.4	1	0.3

*The above section shows the headcount and the FTE (units / 15) of Full-Time vs Part-Time faculty who teach your courses. If the FTE of your FT faculty is larger than headcount, this means that the average teaching load of your FT faculty is greater than 15. If the FTE is lower than headcount, this is a reflection of the amount of release given to your FT faculty.*



**Describe the trends or shifts in the number of full-time (FT) and part-time (PT) faculty, and the number of student credit hours (SCH) taught by FT and PT faculty since the last program/unit review. What Impact, if any, have these trends or shifts had on the program/unit?**

Since the last PUR the Machining Program has added one new full-time instructor. This has allowed the program to maintain its higher than average full to part time ratio while nearly doubling sections offered. Higher section counts have required the program to rely on additional IA's to help maintain lab safety. On average 91% plus of the sections offered by the Machining Program are taught by full time instructors. This is a marked improvement over both the division and the college as a whole. Our ratio allows greater consistency across all offerings,

high school and college.

## 6.C. Support Staff

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Describe the program/unit's support staff, including their FTE, major duties, and any specialized credentials necessary to carry out their duties. Is the number of staff adequate to support the program/unit? Explain.**

Current support staff represent an adequate level of staffing required to maintain the program as it sits. Continued growth will lead to a corresponding need for additional IA's.

The program seeks to create and open a student workers Tool Crip Attendant position within the next two years.

- David Elem
  - IA Ace High School 2017-2019
  - IA TMCC 2019 to present
  - Taught PT MTT 101, 105, 110, 250, 260 from 2019 to present.
  - Taught MTT 292, 293 from 2019-2021
- Xiomara Rodriguez
  - IA MTT 101, 105, 110, 250, 260 from 2019 to 2022.
  - IA MTT 101, 105, 110, 250, 260 from 2019 to 2022.
  - Emergency Part-time instructor from 2019 to 2022.
- Ryan Sherwood
  - ACE High School IA from 2020 to present.
- Juan Solis
  - IA MTT 101, 105, 110, 250, 260 from 2015 to 2019
  - Taught MTT 234 in 2021.
  - Taught MTT 230 in 2019
- Kyle Egelhofer
  - IA for TMCC

## 6.D. Facilities and Technology

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Describe the facilities and technology used by the program/unit, and discuss any unique requirements. These may include labs, studios, off-campus sites, computer classrooms, specialized equipment, etc. Are program/unit facilities and technology adequate to support the program? Explain.**

CLASSROOM EDSN 162:

- Mastercam CAD/CAM
- HAAS Simulators
- SMART Classroom

CLASSROOM EDSN163:

- Snap-On/Starrett Precision and Advanced Measuring NC3 Labs
- Laser Cutter/Engraver
- Coordinate Measuring Machine
- Optical Comparator
- Rockwell Hardness Tester
- Inspection Stones
- Industry Standard Measuring Instruments.
- Machinist Microscopes

CLASSROOM EDSN 164

- Swiss Lathe (In process)
- Nine ACER 1440 Manual Lathes with DRO's
- One ACER 1760G Manual Lathe with DRO
- Seven ACER E-Mills with DRO's
- Two TREK manual/CNC mills
- ACER Surface Grinder
- Five Baldor Bench Grinders
- One Dake Drill Press
- Two Sand Blast Cabinets
- One HAAS SL10 CNC Lathe
- One HAAS ST10 CNC Lathe
- One HAAS ST20 CNC Lathe
- One HAAS VF1 CNC Lathe
- One HAAS VF2 CNC Mill
- One HAAS VF4SS CNC Mill with 5<sup>th</sup> Axis Trunnion.
- One Kalamazoo Horizontal Bandsaw
- One Vertical Bandsaw
- One Hydmech CNC Bandsaw
- Lista Toolroom Cabinets with complete Machining Tooling

STORAGE CONTAINER

- Aluminum, Brass, and Steel Machining Stock

SUPPLY CLOSET

- Fasteners
- Injection Molding Machine
- Shop Towels

STORAGE SHED

- Coolant
- Plexiglass
- CNC Router

## 7.A. Five-Year Plan

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Using your analyses from previous sections, develop a 5-year plan for the program(s). Include an estimated timeline of goal completion. Please address the following questions:**

- **Using the most significant curriculum and assessment-driven findings, describe strategies to sustain or improve student learning. This may include deactivating existing courses or introducing new courses or programs to meet current trends in the discipline or industry.**

- **After considering the most significant enrollment findings, discuss strategies, if needed, to improve enrollment and address these factors. These may include more efficient scheduling, streamlining pathways to completion, outreach to underserved students, internal or external factors anticipated to impact future enrollment, etc.**

- **With respect to course completion rate, graduation, and transfer, discuss strategies to enhance student success and close equity gaps. These may include curriculum changes, pedagogical changes, streamlining pathways to completion, improving advising, mentoring, retention efforts, etc.**

**Considering the above strategies, what are the major goals that the department/unit hopes to accomplish in the next 5 years? Include an estimated timeline of goal completion. How does the department or unit plan align with the Academic Affairs Strategic Plan or the College's Strategic Master Plan?**

During the next five years the department plans include the absorption of the Print Reading class formerly managed by the Drafting Program into the Machining Program as a stand-alone MTT course controlled within the Machining Department. This course will be utilized by Machining, Welding, Advanced Manufacturing and Logistics Management Programs. This new course will allow the department to readily adapt the course to meet changing industry practices and improve the content and delivery to better suit students and local employers. It is the goal to have this course offered in the 2023-2024 catalog.

The department will also develop and implement a new industry driven Swiss Turning course tentatively MTT 23X CNC IV. This course will be built from the ground up in collaboration with industry representatives and intended to expose students to machining practices, processes, and equipment who's use is rapidly growing in the industry' both locally and nationwide. Implementation of this course will require significant reallocation of Lab space to facilitate installation of the required industry supplied equipment. The Lab reorganization is planned for spring 2023 with the goal of offering the course under the 2024-2025 catalog. This course has been developed in response to industry feedback, and at the request of our advisory board. Nearly all equipment and supplies required have been secured through industry donations. The program is actively seeking funding for the remaining requirements, mainly supplies.

Assessment data indicates new CNC Milling Machines and Manual Lathes will be required to minimize equipment bottlenecks that are currently impacting student access to lab equipment and ultimately impacting student success. The program will diligently pursue funding for the purchase and installation of requested new equipment. This goal will remain on ongoing process for the department.

Based on recommendations from Advisory Board, MTT 140 will be deactivated. The department will replace MTT 140 with two new 2 credit inspections classes, tentatively MTT 14X Inspection I and MTT 14X Inspection II. These new courses will be built around the National Coalition of Credentialing Centers (NC3) curriculum, equipment, and certification process for both precision measuring (Inspection I) and advanced precision measuring (Inspection II). Both of these courses will feed into a yet to be built skills certificate, tentatively Quality Assurance Skills Certificate. These new courses are planned to be offered first in the fall 2023 semester and formally offered under the 2024-2025 catalog.

The program will invest in creation and development of custom training videos for each course within the open lab sections. These training aids will improve and enhance student success by allowing, via Canvas, continuous access to relevant lab demonstrations. As many videos will be required this will be a continuously ongoing endeavor with the goal of completing the project at a rate of one course

per year. Our plan is to start with MTT 101 and MTT 105 for the Fall 2023 semester and completed in the Spring of 2024.

Courses requiring production of video content include MTT 101 Introduction to Machine Shop, MTT 105 Machine Shop I, MTT 110 Machine Shop II, MTT 120 Technical Print Reading, MTT 140 Inspection Techniques, MTT 230 CNC I, MTT 232 CNC II, MTT 234 CNC III, MTT 250 Machine Shop III. MTT 260 Machine Shop IV, MTT 292 CAM I, MTT 293 CAM II

The Machining Unit will continue to attempt to have put in place a permanent funding solution adequate to meet the programs need for trained IA's.

The unit will actively pursue funding for full time instructors it attend professional development activities at the International Machine Tool Show (IMTS). IMTS is the preeminent industry trade show at which all new and emerging technology is showcased. It routinely highlights industry trends and places a focus on educational seminars.

The Machining Program will coordinate with administration and facilities, and will pursue funding to increase both the lab and classroom footprint to accommodate increased enrollment of both college and dual credit high school programs. Additionally, a dedicated storage space will be required for machining related equipment and supplies.

## 8.A. Resource Requests

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

**Identify any resource requests. For each request, please indicate whether the request is for an additional faculty and/or staff position, capital improvements (facilities), technology or specialized instructional resources, or professional development. Address the following items:**

- **Request (Additional faculty/staff, capital improvements, technology or other specialized instructional resources, or professional development)**
  - **Estimated time to hire or time the request will be made.**
  - **Projected measurable outcomes. Which PLOs and/or student success metrics does the department hope to improve as a result of the request?**
  - **Alignment to the Academic Affairs or College's Strategic Plan**

**Resource requests:****Professional Development:**

The program will pursue funding for both full time professors to attend IMTS.

Estimated timing of request: 2024-2025 Academic year.

**Outcomes impacted:**

Professional development has the potential to impact each outcome within the program. Alignment:

Academic Affairs Strategic Plan - Objective 5 Recruit, develop, and retain diverse faculty.

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

**STAFFING – Permanent IA funding for both the college and high school programs.**

Estimated timing of request: Immediate.

**Outcomes impacted:**

MTT101 - Introduction to Machine Shop

- 1. Successful students will be capable of conducting themselves safely within a machine shop environment.

**Alignment:**

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

**Equipment/Instructional Resources:**

CNC MILLING MACHINE

Estimated timing of request: Immediate.

**Outcomes impacted:**

MTT 232 CNC II

- 3. Students will discuss and employ machine management principals governing CNC mill operations.
- 4. Students will operate a CNC milling machine to facilitate completion of student projects.
- 5. Students will program, set-up and produce a variety of precision CNC mill projects.
- 7. Students will work as a team to design, program, produce and assemble a

## group CNC

## Alignment:

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

## CNC LATHE

Estimated timing of request: 2024-2025 Academic year.

## Outcomes impacted:

- 3. Students will discuss and employ machine management principles governing CNC turning operations.
- 4. Students will program, set-up and produce a variety of precision CNC lathe projects.
- 6. Students will work as a team to design, program, produce and assemble a group CNC

## Alignment:

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

## FIBER LASER

Estimated timing of request: Immediate.

## Outcomes impacted:

## MTT292 - Computer-Aided Manufacturing I

- 1. Students will apply principles of geometry to create geometric shapes within a CAM system.
- 2. Students will calculate data point locations within a polar coordinate system.
- 3. Students will create and manipulate accurate 2 1/2 axis toolpath models within a CAM system.
- 4. Students will create and manipulate accurate two-dimensional geometric models within a CAM system.
- 6. Students will perform scale factor calculations to resize objects within a CAM system.

## Alignment:

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs



TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

3D Printer

Estimated timing of request: 2025-2026 Academic year.

Outcomes impacted:

MTT293 - Computer-Aided Manufacturing II

- 1. Students will create and manipulate accurate 3 axis toolpath models within a CAM system.
- 2. Students will create and manipulate accurate three-dimensional geometric, solid, and surface models within a CAM system.

Alignment:

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

MANUAL MILLING MACHINES

Estimated timing of request: 2023-2024 Academic year.

Outcomes impacted:

MTT250 - Machine Shop III

- 1. Students will perform precision end milling operations on a milling machine.
- 2. Students will perform precision face milling operations on a milling machine.
- 3. Students will perform precision side milling operations on a milling machine

MTT260 - Machine Shop IV

- 1. Students will perform precision boring operations on a milling machine.
- 2. Students will perform precision form cutting operations on a milling machine.
- 3. Students will use angle fixtures to perform precision angular cutting operations on a milling machine.

Alignment:

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

MANUAL LATHES

Estimated timing of request: 2023-2024 Academic year.

Outcomes impacted:

MTT105 - Machine Shop I

- 1. Students will perform precision drilling operations on an engine lathe.
- 2. Students will perform precision facing cuts on an engine lathe.
- 3. Students will perform precision turning operations on an engine lathe.

**MTT110 - Machine Shop II**

- 1. Students will perform precision grooving operations on an engine lathe.
- 2. Students will perform precision tapering operations on an engine lathe.
- 3. Students will perform precision threading operations on an engine lathe.

**Alignment:**

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

**CNC SIMULATORS**

Estimated timing of request: 2023-2024 Academic year.

**Outcomes impacted:****MTT230 - Computer Numerical Control I**

- 1. Students will calculate data point locations within a two axis Cartesian coordinate system.
- 2. Students will calculate tapers.
- 3. Students will discuss and employ machine management principles governing CNC turning operations.
- 4. Students will program, set-up and produce a variety of precision CNC lathe projects.
- 5. Students will use algebraic principles to calculate CNC program data points.
- 6. Students will work as a team to design, program, produce and assemble a group CNC project.

**MTT232 - Computer Numerical Control II**

- 1. Students will calculate cutter speeds and feed rates.
- 2. Students will calculate data point locations within a three axis Cartesian coordinate system.
- 3. Students will discuss and employ machine management principals governing CNC mill operations.
- 4. Students will operate a CNC milling machine to facilitate completion of student projects.
- 5. Students will program, set-up and produce a variety of precision CNC mill projects.
- 6. Students will use right angle trigonometry to calculate CNC program data points.
- 7. Students will work as a team to design, program, produce and assemble a group CNC project.

**MTT234 - Computer Numerical Control III**

- 1. Students will create multi-axis CNC G-code programs utilizing proper program commands and format.
- 2. Students will employ machine management and set-up principles governing multi-axis CNC equipment.

- 3. Students will operate multi-axis CNC equipment to facilitate completion of student projects.

Alignment:

TMCC Strategic Plan OBJECTIVE – 4. Foster student learning and preparation with high-quality instruction.

Academic Affairs Strategic Plan - Objective 3 - Prepare students for further education and employment in the community by offering well-planned, in-demand, and high-quality programs

TMCC Core Theme 1: Student Success

TMCC Core Theme 2: Academic Excellence

## Academic Standards and Assessment Committee Findings and Recommendations

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

Machining PUR 2022-2023

Date of review: 3/3/23

Self study meeting: 4/11/23

### Academic Standards and Assessment Committee's Findings:

The Machining program provides valuable training to students who are looking to enter the workforce. There is projected growth demand for jobs the program prepares students for and the program has a strong commitment to lowering costs for students wherever possible. There is concern that there is no indication of accessibility needs being met and that equity gaps for course pass rates and awards were not analyzed. The resource requests are data informed, reasonable, and in-line with the college and division plans.

### Program Strengths:

- Meaningful progress has been made on previous Machining specific recommendations.
- Strong job demand and projected growth in the northern Nevada region.
- Strong commitment to low cost materials and OER.
- There has been a significant increase in Hispanic students (18.4% - 34.6%) over the past 5-years.
  - Courses are being developed as a response to industry needs and advisory board recommendations.
  - Goals presented are lofty but achievable.
  - Resource requests are reasonable, supported by data, and in-line with the college plan.

## Areas of Concern or Improvement:

- No indication of work being done to meet accessibility needs.
- Assessment data is being collected but it is not clear how it is being used to improve program learning outcomes achievement.
- There is a noted male:female equity gap in enrollment; equity gaps for course pass rates and awards given were not analyzed.

## Recommendations:

- Work with the DRC to ensure that program instructional materials are accessible; recommend taking the “Creating Accessible Content” Canvas course.
- Review CLOs for MTT 261 and 291 to indicate that these are student specific courses.
- Evaluate potential reasons for increased Hispanic student enrollment and, if appropriate, apply those to other equity gaps.
- Evaluate course pass rates and awards given for any equity gaps.
- Develop a plan for programmatic improvement based on student success metrics and mitigating equity gaps with clear time-lines over the next 5-years.
- The committee supports the resource requests including the CNC Milling Machine, Fiber Laser, 3D Printer, Manual Milling Machine, Manual Lathes, CNC Simulators, and IA funding; we also support the additional space needed.

## Other comments:

This question has not been answered yet

## Dean's Findings and Recommendations

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

## Academic Dean's Findings:

This is a strong and growing department, shepherded by two dedicated and highly effective professors. They have creatively made best use of the facilities, resources, and technology provided to them to meet students' needs. Strong partnerships with high schools to create pathways to our programs. Staying current by heeding advisory board recommendations. Additional resources and space are needed. Recruitment of women should continue. Some curriculum alignment between the catalog, courses and program maps needs to be done.

## Strengths:

Strong teaching presence by highly credentialed professors (91% of sections taught).  
Completed prior goals of facility expansion and equipment procurement to meet student demand and improve student success.  
High course completion rates (higher than the division and college).  
Strong enrollment.  
Increased diversity of student population (women and Hispanics)  
Strategies implement to increase affordability and thereby, accessibility for students.

Labor market data favorable for completers to get jobs.  
Right Skills and ACE High School programs.  
Acting on advisory board input.

### **Areas for Improvement:**

Describe how program learning outcomes align to the department mission.  
Misalignment between current catalog and programs shown in this plan.  
AAS Productions, Industrial Electricity SC and CNC Turning Ops and Prog. SC are not in the catalog.  
Mismatch of courses in the map for the AAS to course in the catalog for the AAS.  
DFI -110 and MTT150 are in the catalog, but not on the map.  
CE290, MPT140M, MTT101, MTT110, MTT234, MTT260, MTT261, MTT291 and MTT293 are in the map but not in the catalog.  
Section 6D - No response as to the current adequacy of the facility and technology.  
Program completions  
Continue to recruit women.

### **Summary Action Recommended (Continue program(s), significantly revise, discontinue, etc. followed by explanation):**

Continue to support this growing department's resource needs.  
Ensure curriculum alignment of courses and program maps with the current catalog.  
Continue the ACE partnership and Right Skills activities.  
Continue to retool based on advisory board input.

### **Recommendations and Implementation Timeline:**

Need to plan for a larger facility and more equipment (next 1-2 years)  
Secure stable funding for IA support ( 1 year)  
Plan for increasing annual operating budget commensurate with growth (annually)

### **Resources Necessary for Implementation of Recommendations:**

Larger facility.  
Larger operating budget (personnel, supplies)  
Additional equipment

### **Impact of Recommendations on Division Planning:**

Need to plan for a larger facility and more equipment.  
Secure stable funding for IA support.  
Plan for increasing annual operating budget commensurate with growth.

### **Impact of Recommendations on Program/Unit Faculty:**

Curricular work needs to be done to ensure alignment of maps with the current catalog.

## Vice President of Academic Affairs' Findings and Recommendations

### Manufacturing Technologies - Machining 2022-23 PUR Self-Study

#### **VPAA's Findings and Conclusions: (Include which of the ASA Committee's and Dean's findings and recommendations were upheld or not upheld.)**

Machining is a strong and vital program, and it does great work to deliver instruction for our students and community. The recommendations made by the Dean and ASA are upheld. I will note that the Hispanic enrollment exceeds the institutional average, and the program continues to market to female students. The FT faculty are very skilled and their instruction is comprehensive. Assessment data should be used to identify areas for improvement.

#### **Strengths:**

The FT faculty care deeply about the program and its success, and their support for CTE promotional fairs and events is always appreciated. Professor Oswald does tremendous work and his production of the TMCC Mace for 2023 Commencement was a remarkable accomplishment and contribution.

#### **Areas for Improvement:**

The machine shop is a tight fit for the equipment on hand. Any disused equipment should be sent to surplus if possible. The shop should be expanded to move the offices out beneath the mezzanine and free up space for instruction.

#### **Recommendations and Next Steps for the Program Based on the PUR:**

#### **(Include whether the program should be continued, significantly revised, or discontinued, followed by a rationale.)**

This program should be continued, and investments should be made to support its growth, where data can be used to verify needs.

#### **Resources Needed to Implement Recommendations Towards Program Improvement or Enhancement:**

Updates to the physical layout of the lab are needed to ensure sufficient instructional space.