

New Program Proposal
Associate in Applied Science, Computer Numerical Control (CNC) Programming
and Operations
Tri-County Technical College

Summary

Tri-County Technical College requests approval to offer a program leading to the Associate in Applied Science degree with a major in Computer Numerical Control (CNC) Programming and Operations to be implemented in Fall 2013. The proposed program is to be offered through traditional instruction on campus and will replace the existing machine tool technology major. Tri-County currently offers three related certificate programs: Introduction to CNC, CAD/CNC Fundamentals, and CNC Math and Print Reading. The following chart outlines the stages for approval of the proposal; the Advisory Committee on Academic Programs (ACAP) voted to recommend approval of the proposal to the Committee on Academic Affairs and Licensing (CAAL). The full program proposal **is attached**.

Stages of Consideration	Date	Comments
Program Planning Summary received and posted for comment	11/28/2012	Program Planning Summary accepted without comments or questions. Note: the staff agreed to an exception to the 11/1/2012 deadline for submission to expedite the item.
Program Planning Summary considered at ACAP	12/15/2012	Planning Summary was accepted without comment
Program Proposal Received	1/15/2013	
Program Proposal posted to ACAP members for review	2/28/2013	Program Proposal accepted without comment or question
ACAP Consideration	3/21/2013	No substantive discussion by ACAP members

Recommendation

The staff recommends that the Committee on Academic Affairs and Licensing commend favorably to the Commission the program leading to the Associate in Applied Science degree with a major in Computer Numerical Control (CNC) Programming and Operations at Tri-County Technical College, to be implemented in Fall 2013 provided that no additional "unique cost" or other special state funding be required or requested.



SOUTH CAROLINA TECHNICAL COLLEGE SYSTEM
New Program Proposal Submission Form

College Name Tri-County Technical College
Program Title Associate in Applied Science, with a major in CNC Programming and Operations
CIP Code 480501 Credit Hours 67
Academic Unit Engineering and Industrial Technology Division, Engineering Technology
Implementation Date (Proposed) Fall 2013
Local Area Commission Approval Date: December 12, 2011

Questions about this program proposal should be directed to Galen Dehay/Doug Allen
Phone: 864-646-1766/646-1341 Email: gdehay@tctc.edu/dallen1@tctc.edu

President's Signature _____ Date _____
CAO Signature _____ Date _____
CBO Signature _____ Date _____

I. Proposal Narrative: Justification

- a) State the purpose(s) and objectives of the program. Provide details on the employment for which graduates will be prepared.

Tri-County Technical College (TCTC) proposes to offer an Associate in Applied Science, major in Computer Numerical Control (CNC) Programming and Operations. In recent years, technical advisory committees have recognized the need, and communicated a desire for TCTC to deliver graduates with a greater array of skills than the existing Machine Tool Technology (MTT) program currently offers. While a preparatory foundation of basic and traditional MTT machining skills is important, the future will require graduates to possess skills in CAD design/analysis, CNC code programming, and the operation of advanced CNC machining centers. Such multi-disciplined technicians/operators are currently in great demand with even greater demand anticipated in the near future.

As a result of the evolution of the employment needs in the machining industry, it is recommended that CNC Programming and Operations curriculum replace the existing MTT program at TCTC. In doing so, the college will provide the caliber of graduates industry demands.

The proposed program will prepare graduates to work as CNC programmers and operators with manufacturers requiring high-production volumes or short run batches of discrete parts. In addition to writing CNC programs, students will learn CAD design and analysis applications, create precision set-ups, select tooling, and operate a variety of CNC milling and turning centers.

- b) Explain how the program will support and/or complement the college's mission?

The mission of TCTC is to provide opportunities that support the economic and lifelong development of the citizens of Anderson, Oconee, and Pickens counties. This program will provide high tech training for interested citizens and create a prepared workforce for the industrial sector.

c) Discuss general student interest in the program.

Students are very much aware that manufacturing has moved from manually operated machines to CNC centers to maintain competitiveness in today's global markets. Many prospective students have expressed the desire to receive advanced CNC training opportunities that match local manufacturers' requirements. Recent graduates of the existing associate degree program in MTT have also expressed strong interest in learning more about computer controlled operations as they are finding employment with companies that require CNC knowledge and skills.

d) Discuss local, state, and national employment trends for program-specific occupations. Include full-time and part-time wage information at the state and regional/national level.

According to the most recent US Department of Labor data (2012), overall employment of computer controlled programmers and computer controlled machine operators is expected to increase by 4 percent to 7 percent nationally over the next eight years. Median hourly wages for programmers and operators ranged between \$15.34 and \$22.37.

The national average is comparable with South Carolina's hourly mean wage of \$17.15 for computer controlled machine operators in metal and plastic. Regional wages in the Upstate range between \$14 and \$21. With an employment of 3,520, South Carolina ranks tenth in the states that have the highest level of employment in this field. (Occupational Outlook Handbook 2010-2011 Edition, Occupational Employment and Wages, May 2010).

e) Include a list of all related existing programs within the institution. Compare/contrast the proposed program to related programs.

The proposed program will be offered under TCTC's Engineering and Industrial Technology Division. Under this division, the college offers three related certificate programs – Introduction to CNC, CAD/CAM/CNC Fundamentals, and CNC Math and Print Reading.

As explained in the introduction, the college currently offers an Associate in Applied Science, major in Machine Tool Technology (MTT). The CNC program differs from MTT in that the focus is on computer controlled operations program versus those that are mostly manual. The proposed CNC program will replace the existing MTT program.

f) Compare/contrast the program to those with similar objectives at other SC technical colleges. Where possible, summarize enrollment, graduates, and placement rates for existing programs. This information can be found in the State Board's annual Program Evaluation Report.

The proposed program will be the first model of its kind for the SC Technical College System. Eight colleges – Florence-Darlington, Greenville, Midlands, Northeastern, Orangeburg-Calhoun, Piedmont, Spartanburg, and Trident – offer associate degree programs in Machine Tool Technology.

g) Discuss any existing articulation or collaborative agreements in related program areas with other SC technical colleges.

There are no formal plans for articulation with other technical colleges at this time. However, students enrolled in the CNC program will receive transfer credit for coursework taken at another technical college within the SCTCS.

h) Indicate whether this is a terminal degree program (occupational in intent). If there is potential for students to transfer into a baccalaureate program, provide narrative on the progress to date concerning articulation agreements with potential transfer institutions.

The proposed degree is designed primarily as a terminal degree leading to employment upon graduation.

- i) **Briefly summarize/analyze the needs survey results. For at least a three-year period, estimate the anticipated number of full-time and part-time openings. Discuss any specific employer interests and support for the program.**

Nine companies from TCTC's three-county service area were surveyed. Approximately 78% of those surveyed offered tuition assistance. Employers indicated a total of 57 full-time job openings over the next three years (20 in year one, 19 in year two, and 18 in year three).

II. Proposal Narrative: Enrollment

- a) **Explain the program admissions criteria.**

Admission into a degree program requires a high school diploma or a GED. Prospective students must complete an application, pay an application fee, have official transcripts sent to the College, and take the COMPASS placement test for mathematics and English. Students meeting these requirements are accepted into the degree program. The appropriate level of mathematics and English courses will be determined based on placement test scores.

- b) **State the anticipated total number of enrollment for the first year of the program. Include the total number of transfer students from other internal programs and new students to the institution. Provide the estimated attrition rate and explain possible causes of attrition. Also include the anticipated number of graduates from the program.**

Anticipated Total Enrollment: 20

Total # Transfer: 5

Total # New: 15

Estimated Attrition Rate: 25%

Estimated Graduation Rate: 75% (15 graduates)

Rates are based on current performance in the MTT program. Possible causes of attrition include lack of student preparedness, personal issues, and rigor of material.

- c) **Based on the information above, complete enrollment tables A and B below.**

Note: Table B should include enrollment numbers for new students only.

TABLE A: PROJECTED TOTAL ENROLLMENT						
YEAR	FALL		SPRING		SUMMER	
	HEADCOUNT	CREDIT HRS	HEADCOUNT	CREDIT HRS	HEADCOUNT	CREDIT HRS
2013	20	320	19	266	18	144
2014	37	592	35	474	18	144
2015	37	592	35	474	18	144

TABLE B: ESTIMATED ADDITIONAL ENROLLMENT (NEW STUDENTS ONLY)						
YEAR	FALL		SPRING		SUMMER	
	HEADCOUNT	CREDIT HRS	HEADCOUNT	CREDIT HRS	HEADCOUNT	CREDIT HRS
2013	15	240	15	210	13	104
2014	20	448	25	340	13	104
2015	20	448	25	340	13	104

III. A) Curriculum Display *Contact the System Office if additional space is needed*

TABLE C: PROPOSED SEMESTER LAYOUT					
1st Semester – Fall					
Prefix	Number	Course Title	Lecture	Lab	Credits
• EGT	151	Introduction to CAD	2	3	3
• ENG	165	Professional Communications	3	0	3
• MAT	170	Algebra, Geometry, and Trigonometry I	3	0	3
• MTT	121	Machine Tool Theory I	3	0	3
• MTT	122	Machine Tool Practice I	2	6	4
Total Semester Hours			13	9	16
2nd Semester – Spring					
Prefix	Number	Course Title	Lecture	Lab	Credits
• MAT	171	Algebra, Geometry, and Trigonometry II	3	0	3
• MTT	124	Machine Tool Practice II	2	6	4
• MTT	251	CNC Operations	2	3	3
• MTT	252	CNC Setup and Operations	2	6	4
Total Semester Hours			9	15	14
3rd Semester – Summer					
Prefix	Number	Course Title	Lecture	Lab	Credits
• EGT	165	Introduction to CAD/CAM	0	6	2
• MTT	141	Metals and Heat Treatment	3	0	3
• MTT	253	CNC Programming and Operations	2	3	3
Total Semester Hours			5	9	8
4th Semester – Fall					
Prefix	Number	Course Title	Lecture	Lab	Credits
• EGT	265	CAD/CAM Applications	1	6	3
• EGT	270	Manufacturing Integration	4	0	4
• MTT	254	CNC Programming I	2	3	3
• PSY	120	Organizational Psychology	3	0	3
• GEN	XXX	General Elective	3	0	3
Total Semester Hours			13	9	16
5th Semester – Spring					
Prefix	Number	Course Title	Lecture	Lab	Credits
• HSS	105	Technology and Culture	3	0	3
• MTT	212	Tool Design	2	6	4
• MTT	255	CNC Programming II	1	6	3
• MTT	258	Machine Tool CAM	2	3	3
Total Semester Hours			8	15	13

TABLE C: PROPOSED SEMESTER LAYOUT

PROGRAM TOTALS	48	57	67
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- b) **If applicable, provide the course title and description for all new courses that will be added to the college's local catalog. Place an asterisk (*) beside those that will also be new to the SBTCE Statewide CAC.**

N/A

- c) **Provide a brief explanation of the planned assessments of student learning outcomes that will be used.**

Using established industry standards and practice, the students will be evaluated by written and oral examinations and the demonstration of skill competencies within a laboratory environment. All assessment activities will be documented as part of the college's annual accreditation preparatory review. In this process, outcomes and objectives will be evaluated, and action plans will be implemented to reinforce positive assessment findings and to bolster areas of needed improvement as indicated.

- d) **If the program requires clinical support, provide narrative demonstrating that the college has secured commitments from service area employers to support an adequate number of clinical/work experience sites (i.e. should meet the needs of the number of students displayed in the enrollment charts).**

Although no formal internship or cooperative learning experience will be required, several local companies have expressed interest in providing students enrolled in the CNC program with these opportunities. Currently, there are existing industry partnerships within the current MTT program and those partners have indicated a willingness to offer continued support once the new CNC program is established.

IV. Proposal Narrative: Faculty

a) List all administration, faculty, and staff positions that will support the program. Do **NOT** include individual names. Instead, list the position title and indicate if it is a new or existing position. Explain any changes or additions to existing positions (e.g. shared department heads, administrative assistants, etc.)

- **Administration**

Dean – Engineering & Industrial Technology (Existing)
Department Head- Engineering Technology (Existing)
Program Coordinator-Engineering Design & Machining (Existing)

- **Faculty**

(2) Adjunct Faculty (Existing)
(2) Full time Positions (Existing)

- **Staff**

Office Manager-Engineering & Industrial Technology Division (Existing)

b) Complete the chart below outlining required qualifications for each faculty position listed above.

TABLE D: FACULTY QUALIFICATIONS			
List Staff Position by Rank (e.g. Professor #1, Professor #2, Associate Professor #1, etc.)	Highest Degree Earned	Field of Study	Teaching in Field (yes / no)
Adjunct Faculty (2)	Associate Degree	Machine Tool Technology	Yes
Full Time Faculty (2)	Associate Degree	Machine Tool Technology	Yes

c) Discuss institutional plans for faculty development, including, but not limiting discussion to release time for research, consulting, conferences, or curriculum development.

Tri-County Technical College has funds available for faculty and staff professional development including teaching chairs and mini-grant awards offered by Tri-County's Foundation. Any or all of the funds may be used for release time, conferences, or other activities promoting professional edification.

d) Provide definitions for faculty full-time equivalents (FTE).

One full time faculty member has a teaching load of 15 credits or 20 contact hours per semester.

e) Complete the chart below to include ALL positions listed in question A.

Note: All new positions should be placed in the 'New' column and remain in the 'New' column for each subsequent program year. The same applies for all existing positions. A detailed example can be found in the "Faculty" module on T-Web.

TABLE E: UNIT ADMINISTRATION/FACULTY/STAFF SUPPORT						
YEAR	NEW		EXISTING		TOTAL	
	Headcount	FTE	Headcount	FTE	Headcount	FTE
Administration						
2013			3	3	3	3
2014			3	3	3	3
2015			3	3	3	3
Faculty						
2013			4	2	4	2
2014			4	2	4	2
2015			4	2	4	2
Staff						
2013			1	1	1	1
2014			1	1	1	1
2015			1	1	1	1

V. Proposal Narrative: Physical Plant

- a) **Discuss physical plant requirements, indicating any needs for additional physical plant space within the first three years of program operation. Explain any costs associated with the acquisition of physical plant space for the program.**

The CNC Programming and Operations degree program will use existing classroom and laboratory space currently occupied by the MTT and Engineering Graphics Technology programs. The degree program will also use existing analysis equipment, engineering and machine code software.

VI. Proposal Narrative: Equipment

- a) **Discuss equipment needs for the program and explain the planned sources of funding for equipment.**

There are existing CNC Machining Centers and software available to begin offering the program. As the program expands and technology advances, TCTC will utilize funding awarded from a recent SCACCELERATE grant. SCACCELERATE is a four-year grant designed to expand educational and career pathways for adult learners in 17 counties, preparing them for diverse high-skill/high-demand occupations in South Carolina's expanding Advanced Manufacturing sector. Grant partners include Greenville Technical College (lead college), Tri-County Technical College, Trident Technical College, Spartanburg Community College, York Technical College, Technical College of the Lowcountry and Clemson University.

As a SCACCELERATE partner, TCTC received \$280,000 in earmarked funds to upgrade the existing MTT program.

- b) **Itemize each piece of equipment that exceeds \$5,000.**

(1) CNC Turning Center with automatic tool changer and chip conveyor/ with live tooling	\$140,000
(1) CNC Milling Center with automatic tool changer and chip conveyor/ with live tooling	\$140,000

VII. Proposal Narrative: Library Resources

- a) **Provide a quantitative analysis of the current library resources related to the proposed program in adherence to a standard guide (e.g. the ALA Standards for College Libraries). Compare/contrast with the holdings of other institutions who have programs with similar objectives.**

TCTC has a total of 1032 book titles under the subject headings listed below. A cumulative listing of all titles is documented in a spreadsheet currently on file at the System Office.

Subject Headings:

- MACHINE-Tool Industry
- MACHINE-Tools – Vibration
- CUTTING Force
- MACHINE-Tools – Design
- TURNING (Lathe work)
- MACHINING
- MANUFACTURING Processes
- ENGINEERING Graphics -- Study & teaching
- ENGINEERING -- Study & teaching
- INDUSTRIAL Design
- COMPUTER-Aided Design

- b) Discuss current library holdings in relation to the proposed program. Provide as many program-specific examples as possible of relevant resources currently available at the institution (e.g. *The Mechatronics Handbook...* for a new Mechatronics program).**

The TCTC Library has a total of 327 books under the subject headings noted below. A cumulative listing of all titles is documented in a spreadsheet currently on file at the System Office.

Using the subject headings:

- MACHINE-Tool Industry
- MACHINE-Tools – Vibration
- CUTTING Force
- MACHINE-Tools – Design
- TURNING (Lathe work)
- MACHINING
- MANUFACTURING Processes
- ENGINEERING Graphics -- Study & teaching
- ENGINEERING -- Study & teaching
- INDUSTRIAL Design
- COMPUTER-Aided Design

- c) Explain any costs associated with library resources for the first three years of the program (e.g. books, AV, serials).**

\$5,001 (i.e., \$1,667 per year) is allocated over the first three years of the program to support the purchase of any updated / additional materials.

VIII. Proposal Narrative: Accreditation, Licensure, or Certification

- a) Explain whether the program is subject to specialized or professional accreditation/approval by any state, regional, or national agency (other than the Commission on Higher Education).**

None

- b) If so, discuss plans to seek such accreditation, including the timeline. Estimate any costs associated with the accreditation plans (within the first three years of the program).**

None

- c) Discuss any licensure or certification requirements for graduates and the extent to which the program will prepare graduates for these exams.**

None

IX. Proposal Narrative: Estimated Costs

a) Complete the chart below to include estimated costs.

TABLE F: ESTIMATED COSTS BY YEAR				
CATEGORY	1st	2nd	3rd	Totals
Program Administration	\$0	\$0	\$0	\$0
Faculty Salaries (including fringe benefits)	\$220,000	\$220,000	\$220,000	\$660,000
Graduate Assistants	\$0	\$0	\$0	\$0
Clerical/Support Personnel	\$0	\$0	\$0	\$0
Supplies and Materials	\$27,000	\$50,000	\$50,000	\$127,000
Library Resources	\$1667	\$1667	\$1667	\$5,001
Equipment	\$280,000	\$0	\$0	\$280,000
Facilities	\$0	\$0	\$0	\$0
Other (Identify)	\$0	\$0	\$0	\$0
TOTALS	\$528,667	\$271,667	\$271,667	\$1,072,001
TOTALS				
Tuition Funding	\$195,000	\$207,000	\$211,000	\$613,000
Program-Specific Fees (<i>course materials fees</i>)	\$54,000	\$65,000	\$65,000	\$184,000
State Funding	\$0	\$0	\$0	\$0
Reallocation of Existing Funds*	\$0	\$0	\$0	\$0
Federal Funding (<i>Equipment to be funded by SCACCELERATE grant explained in Section VII, question A).</i>	\$280,000	\$0	\$0	\$280,000
Other Funding (Specify)	\$0	\$0	\$0	\$0
TOTALS	\$529,000	\$272,000	\$276,000	\$1,077,000

*Specify significant internal sources of reallocated funds. (Add additional rows as necessary.)

b) Explain any “unique costs” or requirements/requests for special state appropriations will be required or requested?

N/A

c) Identify other funding sources, as noted in the last line of the estimated costs table.

N/A