
AS PRE-ENGINEERING PROGRAM REVIEW



**CANKDESKA CIKANA
COMMUNITY COLLEGE**

Spirit Lake Tribe

I. Program description and relationship to the Cankdeska Cikana Community College mission. (See also Appendix A)

The Pre-Engineering program description consists of an Associate of Science Degree in Pre-Engineering providing students with the means for independence and self-sufficiency by allowing them to obtain the equivalent basic engineering instruction they would receive in the first two years of the curriculum at a four-year institution. The program outcomes are in alignment with the CCCC institutional outcomes.

The program is a member of a four-ND TCU collaboration that consists of: (CCCC, Turtle Mountain Community College (TMCC), Nueta Sahnish Community College (NHSC), and United Tribes Technical College (UTTC). This program allows the student to transfer the general education and pre-engineering core/elective credits they have earned at CCCC to a mainstream university and successfully complete the final two years of that universities POS, thus obtaining a bachelor's degree in the engineering discipline of their choice. They also have the option of transferring early to the University with whatever credits they have accumulated at CCCC in the meantime.

Educational outreach to the local High Schools and below can be a very important first step in obtaining commitments from students who would otherwise be unaware of the STEM opportunities offered in their own community. Emphasizing the fact that the local community college can be a vital transitional phase in the earning of a terminal degree thus ensuring a greater chance of success at a mainstream institution in a metro area.

With the addition of two electives focused on advanced manufacturing along with a state-of-the-art laboratory, the program is utilizing technical training in that area to not only act as a gateway to engineering but also as an alternative career pathway if the student decides that the rigorous professional engineering academic route is not what they desire. To accentuate this alternative path, plans are underway to incorporate the Tribal College Apprenticeship Program (TCAP) in tandem with an Advanced Manufacturing Certificate Program. TCAP would create partnerships between CCCC and industry entities to combine academic and on-the-job training to be conducted simultaneously so a certificate can be awarded to an already employed and experienced technician. This worker could then continue his career in the certificate field of study or use it as a launching pad for concurrent engineering studies with their employer.

Obtaining a Bachelor's of Science degree in Engineering opens up the door to graduate studies and/or entry into a professional career with high pay and stature.

Reflection

Strengths

The transferability through articulation of the core and essential studies credits earned at CCCC in this program gives the students a unique opportunity to transition more gradually into the mainstream university culture as well as receiving the aid of an ongoing TCU cohort supported infrastructure. In other words, the alumni student can remain in voluntary contact and be an active member of the cohort by being a mentor and peer-tutor for the community college cohort students enrolled in the respective two-year programs while also receiving continued support themselves through their former CC mentor.

Without this continued contact and support throughout the 4-year degree process, the likelihood of failure to complete has been shown to be more prevalent.

Concerns

The NSF Pre-Engineering Educational Consortium (PEEC) I and II grants that had supported the original two-year TCU members' programs on their respective campuses expired at the end of August 2021. The Ft. Yates member, Sitting Bull College (SBC), had their mentor, Dr. Josh Mattes, relocate to an Eastern University and was not replaced. The Pre-Engineering Program there has been discontinued as it is no longer offered on their website. The remaining cohort members carry on a cooperative while each funds their engineering programs separately.

Progress on concerns from last previous program review (give date of last review, if applicable)

Currently, CCCC funds its lone faculty member's salary through the ICE-TI grant as a math instructor. Student travel and support, along with equipment purchases are being funded through a DOE Advanced Technology Educational (ATE) grant that ends at the end of 2024 and a NASA research grant that goes through the summer of 2026.

Recommendations (Curriculum Committee Use Only)

- Secure outreach funding through state grant avenues available.
- Apply through outside funding agencies and private industry to continue funding for the program.
- Develop sustainability and succession plan, including personnel and financial.

II. Program background information, enrollment and breadth (See also Appendix B)

There is currently one member of the Pre-Engineering faculty:

Mike Parker- Pre-Engineering/Math Instructor

BSME from North Dakota State University

MA Math Ed from Aurora University

Experience: As a US Army Ordnance Officer-Reliability Engineer for the HUMVEE Program Manager, Team Leader for the Tracked Combat Vehicle Depot Overhaul Program (CONUS and Europe), Developmental Test Officer for the M-9 Combat Earthmover Program, all located at the Automotive Tank Command (TACOM) in Warren, MI and the Aberdeen Proving Grounds (APG) in Aberdeen, MD.

He has also been a Farm Owner/Operator in Cando, ND and has been involved in Cast Iron Foundry (Integra Castings) work in Cando, oil field fracturing (Schlumberger) in Williston, ND and manufacturing (Summers MFG) in Devils Lake, ND.

Parker teaches a credit load from 12-18 credits per semester that include both in-house math courses and mechanics/math courses for the cohort. Mr. Haefner resigned from his position 3 or 4 years ago.

Along with the full complement of essential studies, the Pre-Engineering Program offers basically, the first two years of an engineering 4-year degree found at any mainstream university. CCCC provides the traditional four semester math series for engineers and scientists that consist of Calculus I, II, III, and Differential Equations. Concurrently with the former, the traditional set of engineering mechanics (statics, dynamics, and mechanics of materials).

Thermodynamics and surveying have always been taught as summer course at NDSU along With some new electives digital systems, and manufacturing processes. These additions were to accommodate more students interested in software and manufacturing engineering. The summer courses that were funded by the PEEC grant are now funded by a joint TMCC-UTTC ASPIRE grant.

The program enrollment over the past five years has fluctuated from 2 to 9. There was one AS graduate in 2022 and he went on to receive his BS and Master's at NDSU. He is now employed in Fargo as an engineer.

Reflection

Strengths

Despite only one graduate these past five years, the program has four current students and they are expected to obtain their AS in the program. The program is very academically rigorous and has a dropout rate that is comparable to other institutions and many of the students went on to success in other majors. After engineers gain experience at the entry-level in their initial employment, they often times go onto managerial roles higher up in management. These skills obtained are valuable commodities to have when many of them eventually return to the community.

Concerns

The number of graduates is low but at the moment, we have four current students that are on track for graduation or transfer to pursue their 4-year degree. Students are transferring prior to graduating with their credential due to the differing requirements in the areas of engineering specialization they are pursuing.

Progress on concerns from last previous program review (give date of last review, if applicable)

The pandemic derailed outreach efforts to the local high schools which have not returned to previous levels. The goal now is to reach out to the lower middle school grades as well as the area high schools.

Recommendations (Curriculum Committee Use Only)

- Pursue avenues to reduce program credits, generalize credits to apply to multiple specialization areas, or possibly reduce to a single-year program or generalize the credits to be more streamlined for engineering majors looking to specialize in different types of engineering.
- Look for ways for students not wanting to complete the rigorous engineering track to specialize in trade-based certifications and/or electives such as advanced manufacturing, drone licensing, etc.
- Work with outreach and communications to develop a plan for outreach to area middle and high schools and secure funding for the outreach.

III. Program Quality and Assessment (See also attached assessment template(s) Appendix C)

CCCC along with the Pre-Engineering program and cohort as a whole are making it possible to develop and implement AS degrees that focus on the best practices for successfully training engineering students at tribal colleges. A primary focus is to improve transfer success rates and the continued development of programs of study to better reflect the evolving academic pathways of students at the tribal colleges. The development of effective engineering degree pathways, modernized curriculums, and the latest in methods of instructional delivery, along with the necessary support mechanisms, produces models that can be adapted by other institutions to better serve all underrepresented groups. CCCC is part of the higher education discussion about broadening participation in STEM to include minorities due to those demographical populations having been neglected in the past. This outreach would result in an enriched contribution to the global body of knowledge specific to engineering education that would benefit the student population as a whole.

CCCC's Pre-Engineering program, along with its fellow cohorts, has made significant progress towards meeting the goal of establishing a high-quality engineering career trajectory for tribal college students in North Dakota. Each TCU member has established its own curriculum with an overlapping common core element to both synergize and allow for flexible uniqueness in each academic program offering. The community of administrators and faculty were able to find a common core of credits while still allowing for the flexibility to fit within different engineering college disciplines. The program has established an efficient and effective way to expand opportunities for reservation students by making it possible for them to undertake a demanding course of study that can lead them to a professional career.

Answering the challenges that accreditation standards presented in creating an assessment plan, the Pre-Engineering program, along with the rest of the CCCC academic programs, incorporated a workable plan via the Assessment Committee. This plan consisted of providing program outcomes, measurement tools, results of student work assessment, and finally, utilizing the results to improve student learning. These steps have resulted in the enhancement of the ability of students to achieve the course learning outcomes as well as the outcomes at the program and institutional levels. These undertakings are available to the Assessment Committee in the form of an annual report. The teachers undergo annual in-class observations and evaluations done personally by the Dean of Academics to review individual faculty performance in the classroom. A detailed Program Assessment Review is performed each semester under the guidance of the CCCC Assessment Committee to ensure that essential studies and program outcomes are being achieved. Total Program Reviews are performed on a three-year rotating basis from each of CCCC's academic programs, along with brief annual snapshot updates, and then submitted to the CCCC Curriculum Committee for evaluation of overall program viability. All of these cumulative reviews together determine the outcome based educational quality of the program as well as the program's contribution to the campus and community. In addition, course reflection surveys are performed at the conclusion of each semester by the students. These surveys measure the ability of each student to perform the course learning outcomes as listed in the syllabus. Coming as feedback from the students themselves provide another point of accountability for the instructors.

A large percentage of incoming freshmen are deficient in basic math skills that they should already have possessed by completing the requirements for a high school diploma (5.10.18). The Carnegie Pathways math pedagogy that was implemented in the fall of 2018 did not work out as anticipated. The reasons were not so much because of the Carnegie methodology itself but because the necessary component of group inquiry was not met due to low student numbers and attendance. Because of this we have had the Hawkes Quantitative Reasoning curriculum serve as a replacement for Carnegie while maintaining the original Hawkes remedial series (ASC-091, 092, and 093) in its place as an optional pathway for STEM majors who place lower than Math 103 (College Algebra). Also, we have recognized the fact that trigonometry (Math 105) is a pre-requisite to Calculus I (Math 165) along with College Algebra which will aid in facilitating the foundational base of knowledge needed for calculus.

The original Hawkes remedial series (mentioned above) has been adjusted to accommodate an acceleration by eliminating one semester. This was done by combining ASC 091 (Pre-Algebra) and ASC 092 (Intro to Algebra) into a single course, ASC 090 (Algebra Fundamentals). This is followed by the ASC 093 (Intermediate Algebra) course as a preparation for Math 103 (College Algebra). This shortened pathway is advantageous to engineering students especially, who have a long academic career because of the Calculus series and Differential Equations courses to complete.

Reflection

Strengths

The ability to track the NDUS student learning outcomes in the core pre-engineering classes by way of various assessment measuring tools allows the instructors to make necessary changes from one semester to the next or even adjust during the course of one semester to improve delivery of instructional materials to students to ensure learning is progressing.

Concerns

The assessments being performed sometimes expose certain concerns that are not easily addressed. As in all programs of study, the success in any one course depends on how much knowledge is retained by the student in the prior prerequisites. In engineering, this is especially critical for the ongoing pathway achievement to be realized. The cohort has provided peer tutoring (as mentioned in narrative I above) from past engineering cohort alumni to assist in addressing this issue.

Progress on concerns from last previous program review (give date of last review, if applicable)
NA

Recommendations (Curriculum Committee Use Only)

- Continue with the existing assessment activities.

IV. Program cost effectiveness and ability to meet occupational needs (See also Appendix D)

The initial pre-engineering program was part of a pre-engineering educational consortium (PEEC), aligned with other TCU's across the state. That cohort was funded for over ten years by two successive NSF grants, each with extensions. After that funding was concluded, each TCU has continued on its own as far as supporting the respective programs. As for CCCC, the lone faculty member also serves as a math instructor and is paid through the ICE-TI grant which carries on till April of 2025. The DOE advanced technical education (ATE) grant has been extended to the end of 2024 and its remaining funds are budgeted for student travel and support.

Changes within the educational, social, or economic sector served by the program according to the Bureau of Labor Statistics indicate a 11% growth rate for Mechanical Engineers for the decade of 2023-33 (approximately average). The projected percent change for all occupations is 11 percent during the same projected time period.

The program was running in the red for the years 2019-2020 (5 year-time frame of this review) but returned to the black with the resignation of Mr. Haefner thus halving the salary and fringe along with revenues from student remaining steady on average.

Reflection

Strengths

The one faculty member, Mike Parker, will retire from full-time instructing at the end of the fall 24 semester but will continue on as an adjunct. He plans on conducting some of his adjunct classes on-campus if it allows him to maintain some face-to-face mentorship with the pre-engineering students. Also, a new local adjunct faculty coming on in the spring of 25 hopefully will begin a transition to a new engineering faculty. The gentleman has a BS in mechanical engineering from NDSU and a master's in nuclear engineering from Stockholm, Sweden. Perhaps local part-time engineering instructors are the future in keeping the program modestly sustainable while still providing the support that engineering students in a rigorous curriculum require.

Concerns

Student numbers are the main concern affecting this area although with the reduced overhead in salaries and fringe, the program seems sustainable.

Progress on concerns from last previous program review (give date of last review, if applicable)

Adjunct faculty took much of the financial burden carried by the program, with other granting agency monies utilized to provide student support, equipment and instructors.

Recommendations (Curriculum Committee Use Only)

- Implement more aggressive faculty involvement in outreach to local schools through the engineering faculty.
- Use the mobility of the advanced manufacturing infrastructure equipment owned by CCCC to increase opportunities for hands-on experiences for students to garner interest. Much of the new AM equipment purchased through EPSCoR funding is portable and will be able to be carried to local feeder schools for demonstrations.

V. Ability to positively impact CCCC's relationships, partnerships, and alliances

The Pre-Engineering Program has always prided itself on having a first-rate infrastructure to maintain its effectiveness. For almost a decade, the program, in conjunction with its consortium TCU's, maintained and operated a state-wide interactive video network (IVN) via a Polycom hardware system that enabled it to conduct online classes between TCU campuses thus utilizing engineering faculty from each of the institutions to instruct cohort students statewide. This pooling of faculty resources and students was a pioneering process in education that has been recognized by academia at large.

With the advent of the pandemic, CCCC and its partners were already experienced at distance learning, which shortened our learning curve in implementing institution-wide online courses. Now of course, the IVN has been placed by other commercial meeting-group platforms such as Zoom and Teams. The Pre-Engineering department utilizes these now but still augments them with monthly face-to-face cohort meetings where the faculty meet for planning and coordination and the students from the different TCU's work on academic projects while getting acquainted with each other on a personal level. These relationships continue as they transfer to four-year institutions to obtain higher terminal degrees and even on into the workplace.

CCCC has always encouraged and supported faculty development. Mr. Parker was able to obtain his MS in Math Education through Aurora University (located south of Chicago) in the summer of 2020, so he could qualify to instruct the algebra, trigonometry, and calculus courses. The college also takes advantage of HLC offerings of various training modules that faculty and staff are required to complete.

Pre-engineering students have been active in student government, peer-tutoring, and other volunteer work and organizations within the college. Also, they have been active in the Science Dept in the area of performing research and creating poster research presentations. Because of the requirements of the math curriculum in Pre-Engineering, its faculty have been utilized for remedial math courses as well as the college level instruction for much of the student population.

Reflection

Strengths

The abilities in the area of mathematics from both the faculty and students have translated into assisting the math dept in carrying out its academic mission through instruction and tutoring.

Concerns

None

Progress on concerns from last previous program review (give date of last review, if applicable)

NA

Recommendations (Curriculum Committee Use Only)

- Develop apprenticeships in cooperation with TCAP to provide additional student opportunities.

VI. Program Analysis and Reflection Narrative

The program syllabi for courses taught by CCCC as part of the cohort are always updated when an updated syllabus template comes out. The outcomes of the courses taught elsewhere in the cohort are aligned together in the respective TCU syllabus through the NDUS course listings.

CCCC students have been able to coordinate with UND students in advanced manufacturing research funded by a NASA grant. They have successfully worked with not only other undergrads but also with PhD candidates on design teams which ultimately manufacture 3D printed lunar boot attachments.


Having gone from two faculty members down to two adjuncts, created a need to augment the work of the departed employee in the AM lab with student help. The students were quick learners and were able to take up the additional duties in the lab very competently.

Although a small portion of the AM lab equipment is slated to go the CCCC satellite campus at UND for the purpose of utilizing TCAP and University Research opportunities in the Greater Grand Forks area, we hope to replenish the on-campus CCCC lab with \$25,000 worth of new 3D printing and CNC equipment from an EPSCoR equipment grant for the continued CCCC on-site education of our pre-engineering students.

The Program had two full-time faculty and is now going to start the Spring 2025 semester with two part-time adjunct instructors. This presents new challenges as far as student support but seems to be a practical strategy as far as keeping program costs down thus making the program modestly sustainable. Plus, since both faculty are local, it will be possible for one, or both, to make regular campus visits for the purpose of any required on-site instruction as well as other types of counseling or mentorship for the students.

Appendix A

Current CCCC Program of Study showing courses offered and suggested course rotation

 Report of Credits Earned/Needed for Graduation			
Name:		Date:	
AS in PRE-ENGINEERING			
Essential Study Requirements			Semester Credits
ENGL	100	Student Success	1
ENGL	110	ND:ENGL College Composition I	3
ENGL	120	ND:ENGL * College Composition II	3
COMM	110	ND:COMM Fundamentals of Public Speaking	3
DS	110	ND:HUM *** Dakota Culture and History	3
		ND:FA or ND:HUM or ND:HIST	3
		ND:SS or ND:HIST	3
		ND:SS or ND:HIST	3
CSCI	101	ND:COMPSC Introduction to Computers	3
MATH	165	ND:MATH ** Calculus I	4
MATH	166	ND:MATH **** Calculus II	4
		ND:LABSC Lab Science Elective	3
		ND:LABSC Corresponding Lab	1
DSL	250	ND:HUM Dakota Language I	3
			40
* Prerequisite of ENGL 110 (College Composition I)			
**Prerequisite of MATH 103 (College Algebra) AND MATH 105 (Trigonometry) or MATH 107 (Pre-Calculus), Grade of C or better			
***Alternate Summer Rotation			
**** Prerequisite of MATH 165			
***** Prerequisite of CSCI 101			
Core Classes			
ENGR	116	Introduction to Engineering	3
ENGR	117	CADD (Computer aided Design & Drafting)	1
ENGR	204	Surveying	3
MATH	129	ND:MATH Basic Linear Algebra	3
MATH	265	ND:MATH * Calculus III	4
MATH	266	ND:MATH * Differential Equations	3
ME	221	* Engineering Mechanics I (Statics)	3
ME	222	* Engineering Mechanics II (Dynamics)	3
Program Electives			Choose from Program Electives below
			6
			29
*Prerequisites or Corequisites exist. See advisor for details.			
			Total
			69
Program Electives			
AM	101	3D Modeling for Advanced Manufacturing	3
AM	201	AM Functional Prototyping & Project Mgmt	3
CHEM	121	ND:LABSC * General Chemistry I	3
CHEM	121L	ND:LABSC General Chemistry I Lab	1
ENGR	275	* Digital Systems	3
ENGR	290	* Manufacturing Processes	3
GEOL	105	ND:LABSC Physical Geology	3
GEOL	105L	ND:LABSC Physical Geology Lab	1
ME	223	* Mechanics of Materials	3
ME	250	* Thermodynamics & Heat Transfer	3
PHYS	251	ND:LABSC * University Physics I	3
PHYS	251L	ND:LABSC University Physics I Lab	1
PHYS	252	ND:LABSC * University Physics II	3
PHYS	252L	ND:LABSC University Physics II Lab	1
*Prerequisites or Corequisites exist. See advisor for details.			
Some program electives may fulfill certain essential studies requirements.			
Note: Program Electives (Students should work with their advisors to choose courses that enhance their chosen field of engineering).			
Current POS Effective Date: 8/2023			
BOR Approved: 3/22/16			
Curriculum Approved Revisions: 3/22/16, 5/11/17, 10/12/18, 12/12/19, 5/12/22, 7/14/22, 2/9/23			
Institutional Updates: 1/31/19, 12/12/19, 12/7/20, 1/1/21, 8/13/21, 7/14/22			



Suggested Course Rotation

AS in PRE-ENGINEERING

Semester 1			Fall	
COMM	110	ND:COMM	Program Elective (Recommended: 3D Modeling for Advanced Manufacturing)	3
CSCI	101	ND:COMPSC	Fundamentals of Public Speaking	3
ENGL	100		Introduction to Computers	3
ENGL	110	ND:ENGL	Student Success	1
MATH	165		College Composition I	3
			Calculus I	4
				<hr/>
				17
Semester 2			Spring	
ENGL	120	ND:ENGL	College Composition II	3
ENGR	116		Introduction to Engineering	3
ENGR	117		CADD (Computer aided Design & Drafting)	1
MATH	129	ND:MATH	Basic Linear Algebra	3
MATH	166		Calculus II	4
ME	221		Engineering Mechanics I (Statics)	3
				<hr/>
				17
			Summer	
ENGR	204		Surveying	3
				<hr/>
				3
Semester 3			Fall	
DSL	250	ND:HUM	Dakota Language I	3
MATH	265		Calculus III	4
ME	222		Engineering Mechanics II (Dynamics)	3
		ND:LABSC		4
		ND:SS or ND:HIST		3
				<hr/>
				17
Semester 4			Spring	
MATH	266		Differential Equations	3
			Program Elective	3
DS	110		Dakota Culture and History	3
		ND:FA or ND:HUM or ND:HIST		3
		ND:SS or ND:HIST		3
				<hr/>
				15

Total 69

Updated: 02/20/19, 12/12/19, 1/1/21, 7/14/22

Appendix B – Program Background Information, Enrollment, and Breadth

Faculty Program Staff and Credit Hour Loads

Name	Title/Position	FT/PT/TEMP	Credit Load/Semester
Mike Parker	Math/Pre-Engineering Instr	FT	12 – 18

Enrollment and Graduation Data

Pre-Engineering	# Enrolled Pre-Engineering	Total Enrollment	Program % of Total Enrollment
Fall 2019	2	160	1.3%
Spring 2020	3	168	1.8%
Summer 2020	2	39	5.1%
Fall 2020	2	182	1.1%
Spring 2021	2	161	1.2%
Summer 2021	2	129	1.6%
Fall 2021	6	248	2.4%
Spring 2022	6	243	2.5%
Summer 2022	5	148	3.4%
Fall 2022	8	316	2.5%
Spring 2023	5	307	1.6%
Summer 2023	3	183	1.6%
Fall 2023	7	325	2.2%
Spring 2024	9	280	3.2%
Summer 2024	3	156	1.9%
Totals	65	3045	2.1%

5-Year Program Enrollments

Program Graduates AS Pre-Engineering				
2023-2024	2022-2023	2021-2022	2020-2021	2019-2020
0	0	1	0	0

Total CCCC Graduates				
2023-2024	2022-2023	2021-2022	2020-2021	2019-2020
76	75	49	35	25

Percentage of Program Graduates to CCCC Graduates				
0.0%	0.0%	2.0%	0.0%	0.0%

5-Year Graduation Rates

Appendix C – Program Quality and Assessment

Most recent two cycles of course/program assessment using current assessment template

Program Assessment Template

2023 / Fall

Pre-Engineering

Program Statement: The Associates of Science (AS) in Pre-Engineering is designed for students who intend to pursue a terminal degree in engineering. The AS in Pre-Engineering provides students with the courses and knowledge to transfer to a baccalaureate engineering degree program.

AM 101 Advanced Manufacturing

- 1) Be proficient in the fundamentals of 3D modeling.
- 2) Have a basic knowledge of advanced manufacturing techniques and processes.
- 3) Be proficient in the basics of producing engineering drawings.
- 4) Have a basic knowledge of metrology.
- 5) Conceptualize and create projects in both 3D modeling and 3D printing.

Program Outcomes

- 1) The student will be able to solve engineering problems by applying knowledge gained from mathematics.
- 2) The student will be able to communicate the interpretation of data.
- 3) The student will be able to use the learning management system to navigate the course.
- 4) The student will have excellent attendance as well as have proper behavior and participation in class.

Essential Studies Outcomes

1. Critical Thinking
2. Communication
3. Technological Literacy
4. Personal Attributes

1. Area of Concern	AM 101 Sp23 Continued funding of instructor due to AM grant ending.
Recommendation of assessment committee and/or faculty	Apply for a no-cost extension on existing AM grant
Result of Recommendation	It was approved so AM has funding for another year.
2. Area of Concern	Am 101 Fa23 Would prefer to teach the class in person.
Recommendation of assessment committee and/or faculty	Will work on on-line delivery methodology, new lab computer will be connected to all of the machines in the lab for increased student local capacity.
Result of Recommendation	
3. Area of Concern	
Recommendation of assessment committee and/or faculty	
Result of Recommendation	

D-Direct List activity(ies) used to measure student success	Goal	Findings - Results (Refer to LEGEND)	Analysis (Contributing factors - Internal and External -resulting in not meeting goal)	Recommendations	Identify Course Outcome(s) being demonstrated	Identify Program Outcome(s) being demonstrated	Identify Essential Studies Outcome(s) being demonstrated
D –Self -led Final project (topology optimization design Implementation) I-Survey	>70%	N =1 NP =0 SR =1/1 Avg. = 88% Range = N/A SR = 1/1	The student was successful in meeting course requirements but punctuality for attendance and coursework deadlines.	Will continue to utilize And refine PBL pedagogy. Enforce no-late homework penalties.	1-3, 5	1-3	1-3

LEGEND for Program Assessment Form Findings (Column 3)

N = NUMBER of students registered in Empower under grading roster

NP = Number of students registered in Empower under grading roster, but did NOT PARTICIPATE in the cumulative assessment

SR = SUCCESS RATIO - Number of students that met goal successfully/Number of students that participated in the cumulative assessment

Avg. = Average score of students that participated in the cumulative assessment

Range = Range of the Scores of students that participated in the cumulative assessment

AM-201
2024 / Spring
Pre-Engineering

Program Statement: The Associates of Science (AS) in Pre-Engineering is designed for students who intend to pursue a terminal degree in engineering. The AS in Pre-Engineering provides students with the courses and knowledge to transfer to a baccalaureate engineering degree program.

AM 201 Advanced Manufacturing

- 1) Be proficient in the fundamentals of 3D modeling.
- 2) Have advanced knowledge of advanced manufacturing techniques and processes.
- 3) Be proficient in the basics of problem framing/scoping.
- 4) Conceptualize and create projects in both 3D modeling and advanced manufacturing.
- 5) Showcase leadership skills suitable for a member of a product development team.

Program Outcomes

- 1) The student will be able to solve engineering problems by applying knowledge gained from mathematics.
- 2) The student will be able to communicate the interpretation of data.
- 3) The student will be able to use the learning management system to navigate the course.
- 4) The student will have excellent attendance as well as have proper behavior and participation in class.

Essential Studies Outcomes

1. Critical Thinking
2. Communication
3. Technological Literacy
4. Personal Attributes

1. Area of Concern

Students were not tracking work completed. (No paper trail)

Recommendation of assessment committee and/or faculty	Have more documentation required of students. Students lacked adequate oversight so more monitoring is needed.
Result of Recommendation	
2. Area of Concern	Course was lacking a “business side exposure” to the design process.
Recommendation of assessment committee and/or faculty	Add on some business management/financial course work to emphasize the business side of an operation.
Result of Recommendation	
3. Area of Concern	
Recommendation of assessment committee and/or faculty	
Result of Recommendation	

D-Direct List activity(ies) used to measure student success	Goal	Findings - Results (Refer to LEGEND)	Analysis (Contributing factors - Internal and External -resulting in not meeting goal)	Recommendations	Identify Course Outcome(s) being demonstrated	Identify Program Outcome(s) being demonstrated	Identify Essential Studies Outcome(s) being demonstrated
D –Self -led Final project (topology optimization design Implementation) I-Survey	P/F	N =3 NP =0 SR =3/3 Avg. = N/A Range = N/A	All students met the stated goals in the course work.	Will continue to utilize And refine PBL pedagogy.	1 - 5	1-4	1-4

Appendix D – Cost Effectiveness and Ability to Meet Occupational Needs

Occupational Needs

National Employment Projections, 2020-2030 Bureau of Labor Statistics	
Occupational Category	Projected Increase
All Engineering Disciplines (ie. Mechanical, Civil, etc.)	11.0%

	New jobs, projected 2016-26	Employment, 2016	Median annual wage, 2016
Total, all engineers	139,300	1,681,000	\$91,010
Civil engineers	32,200	303,500	83,540
Mechanical engineers	25,300	288,800	84,190
Industrial engineers	25,100	257,900	84,310
Electrical engineers	16,200	188,300	94,210
Engineers, all other	8,500	132,500	97,300
Electronics engineers, except computer	5,100	136,300	99,210
Petroleum engineers	5,100	33,700	128,230
Environmental engineers	4,500	53,800	84,890
Aerospace engineers	4,200	69,600	109,650
Computer hardware engineers	4,000	73,600	115,080
Chemical engineers	2,500	32,700	98,340
Health and safety engineers, except mining safety engineers and inspectors	2,200	25,900	86,720
Biomedical engineers	1,500	21,300	85,620
Marine engineers and naval architects	1,000	8,200	93,350
Nuclear engineers	700	17,700	102,220
Mining and geological engineers, including mining safety engineers	600	7,300	93,720
Materials engineers	400	27,000	93,310
Agricultural engineers	200	2,700	73,640

Annual Revenue and Expenditures

Term	Enrollment	Tuition	ISC per FTE	ISC Revenue	Total Revenue
Fall 2019	2	\$3,000.00	\$8,279.20	\$8,279.20	\$11,279.20
Spring 2020	3	\$4,500.00	\$8,279.20	\$12,418.80	\$16,918.80
Summer 2020	2	\$1,500.00	\$8,279.20	\$8,279.20	\$9,779.20
AY 2019-20		\$9,000.00		\$28,977.20	\$37,977.20
Fall 2020	2	\$3,000.00	\$7,356.26	\$7,356.26	\$10,356.26
Spring 2021	2	\$3,000.00	\$7,356.26	\$7,356.26	\$10,356.26
Summer 2021	2	\$3,000.00	\$7,356.26	\$7,356.26	\$10,356.26
AY 2020-21		\$9,000.00		\$22,068.78	\$31,068.78
Fall 2021	6	\$10,800.00	\$8,656.00	\$25,968.00	\$36,768.00
Spring 2022	6	\$10,800.00	\$8,656.00	\$25,968.00	\$36,768.00
Summer 2022	5	\$9,000.00	\$8,656.00	\$21,640.00	\$30,640.00
AY 2021-22		\$30,600.00		\$73,576.00	\$104,176.00
Fall 2022	8	\$14,400.00	\$9,245.00	\$36,980.00	\$51,380.00
Spring 2023	5	\$9,000.00	\$9,245.00	\$23,112.50	\$32,112.50
Summer 2023	3	\$5,400.00	\$9,245.00	\$13,867.50	\$19,267.50
AY 2022-23		\$28,800.00		\$73,960.00	\$102,760.00
Fall 2023	7	\$12,600.00	\$8,700.70	\$30,452.45	\$43,052.45
Spring 2024	9	\$16,200.00	\$8,700.70	\$39,153.15	\$55,353.15
Summer 2024	3	\$5,400.00	\$8,700.70	\$13,051.05	\$18,451.05
AY 2023-24		\$34,200.00		\$82,656.65	\$116,856.65

Term	2023-2024	2022-2023	2021-2022	2020-2021	2019-2020
Salary	\$ 63,743	\$ 61,443	\$ 57,430	\$ 51,064	\$ 57,693
Fringe	41%	40%	36%	35%	35%
# of Program Faculty	1	1	2	2	2
Total Salaries	\$63,743.00	\$61,443.00	\$114,860.00	\$102,128.00	\$115,385.34
Total Fringe	\$26,134.63	\$24,577.20	\$41,349.60	\$35,744.80	\$40,384.87
Total Expenses	\$89,877.63	\$86,020.20	\$156,209.60	\$137,872.80	\$155,770.21
Total Revenue	\$116,856.65	\$102,760.00	\$104,176.00	\$31,068.78	\$37,977.20
Net Gain/Loss	\$26,979.02	\$16,739.80	(\$52,033.60)	(\$106,804.02)	(\$117,793.01)

Program Evaluation and Review (for Curriculum Committee Use Only)

Criteria	Program Exceeds Expectations	Program Meets Expectations	Program Needs Improvement	Program Does Not Meet Expectations
Sec II Enrollment	Increasing	Steady Enrollment is low but steady.	Decreasing	Unsustainably Low
Sec III Quality of the Program as Determined from Assessment Information	The program's quality is substantial and notable.	The program's quality is substantial but could be strengthened through curricular and/or program enhancements, e.g. providing additional resources, adding or deleting courses	The program's quality could be strengthened through reconfiguration, e.g. substantial modification of the curriculum and the reorganization of faculty.	The program's quality and/or contribution to the institution is not substantial enough to justify its continuance
Sec IV Cost Effectiveness	Net Gain	Break Even	Net Loss	Unsustainable Losses
Sec IV Projected Occupational Need (Regional and State Level)	Large Need and Growth in This Area	Moderate Need	Minor or Low Need	No Clear Need for This Degree
Sec V Ability to positively impact CCCC's relationships, partnerships & alliances	Relationships are strong – benefits the overall mission of the college	Relationships, partnerships, and/or alliances could be developed to strengthen the program	Relationships, partnerships, and/or alliances need to be reconfigured in order to positively impact the college	Relationships, partnerships, and/or alliances are not positively impacting the college. The program's reduction or phase out would not adversely impact other programs.

The Curriculum Committee makes the following recommendation(s):

The Committee recommends the program for continuance.

Sustainability, succession, outreach, and financial planning should be the focus for the immediate future, along with expanding into possible certificate and apprenticeship programs.

Follow up actions and timeline:

Proposals and approval for the advanced manufacturing certificate and apprenticeships completed and in place within the next year.



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Completed Program Reviews Verification

Name of Program Reviewed: **AS Pre-Engineering**

Michael Palan
Director or Faculty of Record

11/19/24
Date of Review

Karen Saari
Curriculum Committee Chair

11/19/24
Date of Review

Shaun Young
Dean of Administration

12/2/24
Date of Review

Jackie Rumpers
Academic Dean

11/19/24
Date of Review

Sam L. Solt
President

11-21-24
Date of Review

NA
Chair CCCC Board of Regents (as appropriate)

Date of Review