Sitting Bull College Pre-Engineering Program Review
Fall 2015 – Spring 2020

PART 0. EXECUTIVE SUMMARY

This report is an evaluation of the Sitting Bull College Pre-Engineering A.A. program during the five-year period from Fall 2015 to Spring 2020. The report is comprised of three sections, which are summarized as follows:

I. *Program Description* – SBC offers a variety of math & engineering classes that prepare students for the final two years of a B.S. engineering degree at a mainstream institution (such as NDSU). SBC collaborates with other North Dakota TCUs by sharing synchronous online engineering courses. Thirteen SBC students participated in the program, with an average enrollment of 3.9 students per semester. Two students successfully completed the A.A. degree in Pre-Engineering and are continuing with their 4 year degree, and 2 are currently proceeding with coursework. The other 9 have discontinued their Pre-Engineering studies. Eight of these have unknown current employment/education status.

II. *Program Self-Evaluation* – The quality of the coursework and instruction is high, and mirrors that of NDSU rather closely. Furthermore, there have been some successes, with two students graduating and currently pursuing their 4 year degree. However, the bulk of the students entering the program do not finish it, suggesting that the program on the whole does not meet the needs of its students. Most of the planning goals from the previous Program Review, which were meant to address this issue, were either unsuccessful or were not implemented. The salient question, as of yet unanswered, is whether the program only provides opportunities for a small number of well-prepared students, or instead is capable of addressing the needs and interests of the broader group of students that comprise a sustainable program.

III. *Program Planning* – New funding sources are in need of exploration, as the original grant is terminating. The program was well prepared for the pandemic, with no significant changes required. Program assessment and recruitment activities are very under-developed and are in need of significant enhancement in order to secure the integrity of the program.

This review was prepared by:
Dr. Joshua Mattes – SBC Pre-Engineering Instructor

PART I. PROGRAM DESCRIPTION

1. Role of Program Within SBC

1a. Mission Statement

The Pre-Engineering program is designed to prepare students for transfer to a four-year institution of higher learning in an engineering discipline. Students who complete this program will have a background in mathematics, science, and engineering that enables them to succeed in the 3rd and 4th year of an ABET accredited 4-year engineering program. The provision of this academic and technical preparation is in alignment with the SBC Mission.

The program works collaboratively with other ND TCU pre-engineering programs via the NSF PEEC-PTiPS grant. Thus, SBC students take some courses from other TCU instructors via IVN or Zoom.

Students successfully completing the program will have developed skills in critical thinking, written and oral communication, preparing them for the remainder of a BS in Engineering. Students will also have cultivated an understanding of the ethical and social implications of the engineering craft.

1b. Courses Offered

ENGR 115	Introduction to the Engineering Profession w/ CAD	4 cr.
ENGR 204	Surveying	4 cr.
ENGR 221	Statics	3 cr.
ENGR 222	Dynamics	3 cr.
ENGR 224	Thermodynamics	3 cr.
MATH 107	Precalculus	5 cr.
MATH 129	Basic Linear Algebra	3 cr.
MATH 165	Calculus I	4 cr.
MATH 166	Calculus II	4 cr.
MATH 265	Calculus III	4 cr.
MATH 266	Calculus IV	3 cr.
PHYS 251	University Physics I	4 cr.
PHYS 252	University Physics II	4 cr.

1c. Degrees Offered

Associate of Arts

2. Program Personnel

Dr. Koreen Ressler – VP of Operations at SBC and PI on the NSF grant that funds the program.

Dr. Joshua Mattes – Full-time Pre-Engineering Instructor – offers courses via IVN/Zoom (typically Calc I, II, III, DiffEq, Statics, and Dynamics), and also in-person classes (such as Physics II and Precalculus). Did not teach/work at SBC during Fall 2015 (1st semester of report period).

Dr. Gary Halvorson – Provides instruction for science coursework required for degree (such as Chemistry 121, 122), and provides misc. support services.

Changes @ SBC – Dr. Sharon Marcotte was the NSF PEEC-PTiPS grant coordinator and co-PI at SBC the first two years of the 5-year reporting period. Angel Young provided administrative support services for the program earlier in the 5-year review period.

Other TCU Instructors - There are also faculty at the four grant partner institutions (Turtle Mountain Community College, Nueta Hidatsa Sahnish College, Candeska Cikana Community College, North Dakota State University) that teach/taught classes to SBC students via IVN/Zoom. They are listed below with their degree and their role in the PEEC program.

Austin Allard – *PhD Civil Engineering @ Texas A&M*
Instructor @ TMCC 2018 – 2020

Teri Allery – *MS Construction Management and Engineering @ NDSU*
Instructor @ NHSC 2018 – 2020

Karl Haefner – *MA.Ed Secondary Education @ University of Phoenix; BS Geology @ Grand Valley State University; BS Mechanical Engineering @ Saginaw Valley State University*
Instructor @ CCCC 2016 – 2020

Mike Parker – *MA Math @ Aurora University, BS Mechanical Engineering @ NDSU*
Instructor @ CCCC 2015 – 2020

Robert Pieri – *PhD Mechanical Engineering, Carnegie Mellon*
Instructor and PEEC Grant Lead @ NDSU 2015 – 2020

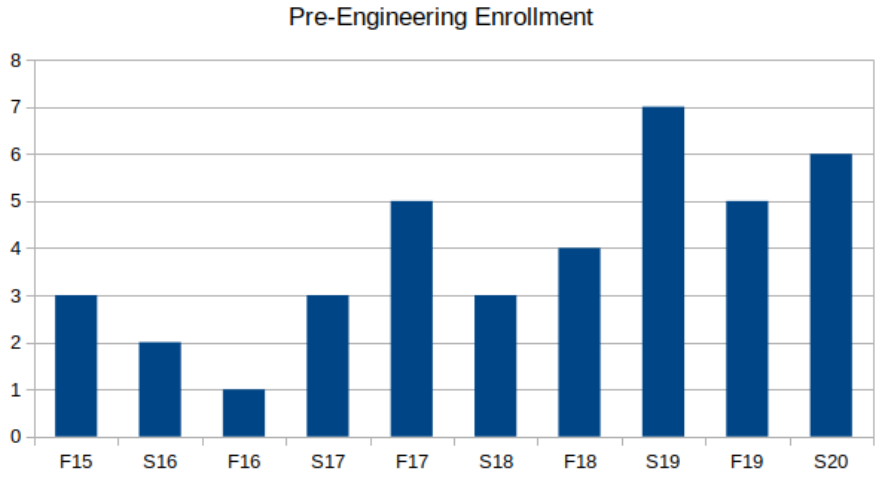
Ann Vallie – *BS Electrical Engineering @ NDSU*
Instructor @ TMCC 2015 – 2018
PEEC Director + Instructor @ NHSC 2018 – 2020

Sharon Veerayah – *MS Math @ Washington State University*
Instructor @ NHSC Spring 2016 – Spring 2018

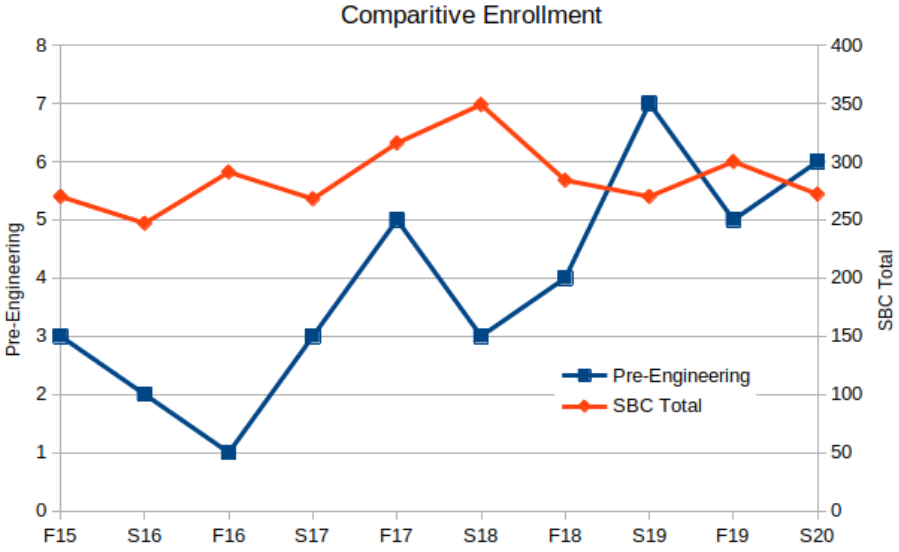
3. Program Productivity Summary

3a. Enrollment

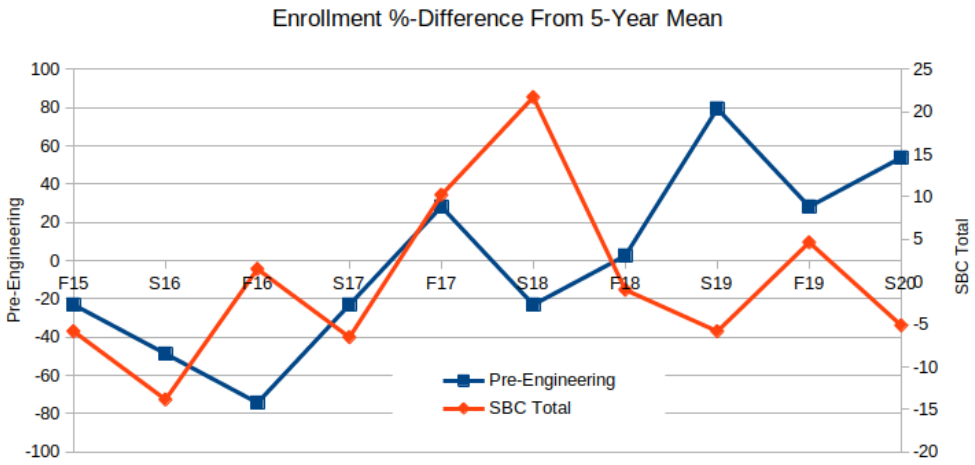
There have been a total of 13 students enrolled in the program over the reporting period, with mean enrollment of 3.9 per semester. The enrollment by semester is shown below.



The variation in enrollment can be compared against the total enrollment at SBC, as shown below.



One can also examine the enrollment as a percent difference from the mean 5-year enrollment, as shown below:



Examination of the graphs suggests there is no significant relationship between Pre-Engineering enrollment and total SBC enrollment, which is to be expected given the very small sample sizes characteristic of Pre-Engineering enrollment. This is also the reason why the fluctuations (in %) are much larger for Pre-Engineering.

There is the appearance of a slight upward trend in Pre-Engineering enrollment, though regarding this as a success indicator for the program is problematic for at least 3 reasons:

1. The primary SBC Pre-Engineering instructor was not teaching at SBC the at beginning of this 5-year reporting period, which could have resulted in artificially low enrollment numbers at the beginning. Any subsequent increases would then be relative to an artificially low baseline, giving the impression of larger increases.

2. The standard deviation of the Pre-Engineering enrollment is 1.8, which is almost 50% of the mean of 3.9. The statistical noise (all the various un-measured factors influencing enrollment) is a very substantial portion of the data, and this precludes meaningful determination of any actual growth rate.

3. While enrollment is encouraging, the primary goal is graduation. This is considered in Section 3c below.

3b. Courses Offered By Semester

All courses have one section offered each semester[1], with the exception of Surveying and Thermodynamics (which are taught at the Summer NDSU PEEC Summer Session) and Physics I/II (which are taught as needed). An illustrative 71 credit 4-semester plan is as follows:

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Math 165 (4) Engl 110 (3) Engr 115 (4) Psyc 100 (3) Csci 101 (3)	Math 166 (4) Chem 121 (4) Math 129 (2) Engl 120 (3) Comm 110 (3) PE Elect (2)	Math 265 (4) Engr 221 (3) Chem 122 (4) Engr Elective (3) Humanities/SS Elect (3)	Math 266 (3) Engr 222 (3) Phys 152 (4) Soc 120 (2) Humanities/SS Elect (3) NAS 101 (4)
17 cr	18 cr	17 cr	19 cr

To lessen individual semester loads, students can take some classes during Summer sessions. Furthermore, most students do not enter the program ready for Calc I (Math 165), and need to start with earlier math classes, meaning that for many students the program is more than 4 semesters.

3c. Graduation and Continuance Data

Of the 13 students enrolled in the program over the 5-year reporting period:

- Two (2/13=15%) students graduated with the A.A. degree. One of them is pursing a B.S. in Computer Science / Computer Engineering at NDSU, and the other (whose transition to NDSU was pandemic-delayed) is continuing advanced coursework at SBC as they prepare to transfer to NDSU in Fall 2021 to continue with a B.S. in Electrical Engineering.

- Two (2/13=15%) students are currently engaged with the A.A. coursework. One is making strong satisfactory progress. The other is struggling and is not making satisfactory progress.

- The other 9 students (9/13=70%) discontinued their studies in the program. One of them is still at SBC pursuing general studies. The other 8 are no longer at SBC, and their current job and educational status is unknown.

A 70% rate of failure to complete the program is much higher than one would want. Exit interviews with select students have indicated that the two primary obstacles to persistence with the program are the difficulty level of the courses and the lack of additional financial assistance (which we cannot provide as per financial aid policy).

As a point of comparison, during the reporting period at CCCC there were 14 total students, 1 graduate, 2 continuing students, and 11 who discontinued. At TMCC there were no graduates in roughly the same number of students, and two are continuing. (Data for NHSC not available at time of report submission). The inherent difficulty level of the program is reflected in the fact that graduation and continuance numbers are relatively low for the other institutions (each with their own policies) in the collaborative.

4. Program Revenue

Year	Fall ISC	Spring ISC	Tuition	Total
2015-2016	7,557.75	8,397.50	7,200.00	23,155.25
2016-2017	6,000.00	11,100.00	16,150.00	33,250.00
2017-2018	18,600.00	11,400.00	20,925.00	50,925.00
2018-2019	9,002.91	22,772.08	14,600.00	46,374.99
2019-2020	19,000.00	21,600.00	13,200.00	53,800.00
Total 2015-2020	**60,160.66**	**75,269.58**	**72,075.00**	**207,505.24**

In addition to the above revenue, the NSF-funded PEEC grant itself provided $200,000 per annum for 2015-2019.

5. Program Expenditures

Description	2015-16	2016-17	2017-18	2018-19	2019-20
Salary	68,095.75	89,417.28	93,428.67	128,534.38	53,149.54
Salary Hourly	0.00	1,096.83	3,094.75	0.00	0.00
Salary Temp.	1,539.12	786.00	0.00	0.00	0.00
Fringe	18,005.39	22,087.32	25,828.02	32,662.81	14,800.94
Travel	205.20	7,571.38	8,388.44	15,947.82	1,206.50
Supplies	10,681.90	74,659.98	65,116.48	5,309.33	606.35
Indirect	14,749.93	29,354.87	36,252.72	39,637.60	10,397.26
Participant costs	8,445.26	22,364.86	54,805.00	6,223.31	27,686.64
Total	**121,722.55**	**247,338.52**	**286,914.08**	**228,315.25**	**107,847.23**

Notes: participant costs does not include any faculty salaries. It indicates direct support to participating students, in the form of financial aid, laptops, outreach activities, etc. Furthermore, there is no grant revenue outside of the academic program: the only influx of non-grant revenue is through student enrollment.

6. Advisory Committee: N/A

PART 2. PROGRAM SELF-EVALUATION

A. Faculty Quality Control

There is only one SBC faculty, so all of the questions related to cross-faculty communication and planning are N/A at SBC. As regards faculty at the other TCUs, there are currently no *formal* mechanisms in place for faculty evaluation. However, there is regular communication with pre-engineering instructors at the other ND tribal colleges, and this helps identify quality control issues. There have been several faculty changes/reassignments resulting from this informal process. The regular meetings also facilitate instructor growth. All of the PEEC instructors from the different colleges have regular in-person or videoconference meetings to discuss student interventions, teaching techniques, best practices, grant opportunities, and general program logistics.

B. Student Relations

The Pre-Engineering program is tailored to student needs. Course offerings and times each semester are informed by the needs of current students. Office hours are set in collaboration with students. Given the small number of students, teaching methods are easily adapted to student preparation level while nonetheless maintaining core standards. A combination of tutoring, group activities, mini-lectures, and open Q&A allows for a class setting that is tailored to the individual students. The general course content is in alignment with that of larger institutions like NDSU, and follows ABET (Accreditation Board for Engineering and Technology) standards.

Some students attended tutoring (often the PEEC instructor was the tutor) and found it helpful, others did not attend. In-class group activities happen on average once per week, and after students picked up the relevant skills and comfort in group communication they found the activities helpful. Some students found them to be the most helpful part of the class. Mini lectures have little efficacy, though some students seem to appreciate the comfort of having previous educational modalities mirrored in their current setting. The mini-lectures covered regular course topics.

During the 5-year review period, two students graduated with their AS degrees, and are proceeding with coursework for their 4 year engineering degree. Two other students are proceeding with their courses, though one of the two is not showing satisfactory progress. The other nine students discontinued their pre-engineering studies altogether. Thus, while there have been a successes, *the bulk of the evidence suggests that the program fails to successfully meet the learning and employment needs of students.*

C. Curriculum Design, Content, Delivery

The curriculum is set largely by the inter-college PEEC collaboration, informed by the constraints of ABET accreditation and transferability of courses to NDSU, and as such does not undergo substantial review or alteration. The course texts and syllabi largely mirror NDSU courses, and as such rely upon their institutional processes related to quality control. Transfer issues impose significant constraints on modifying the course content of core engineering courses, and as such there is minimal modification of course content to address particular student needs, aside from making activities culturally/socially relevant, etc. *The uniqueness of the program lies in the extensive support and coaching that students receive outside of class, not in the courses themselves.*

Indigenous culture is incorporated into the curriculum largely through contextualizing course topics in issues of community concerns. Examples include using calculus to understand the economics of wind-turbine energy generation, or using statistics to understand measurements of local water-quality, or

group projects where students play the roles of engineers working to develop responses to oil spills. Addressing culture in this way – by addressing concerns of the local people as shaped by their history, values, and concerns – was deemed appropriate by several SBC instructors in cultural studies.

D. Assessment Findings and Analysis

No program assessment was performed for 2015-2016, due to the absence of the Pre-Engineering instructor from the college.

The 2016-17 year was the pivotal year of the 5-year reporting period, insofar as multiple large changes were suggested based on the 2016-17 report. The measurement tools for 2016-17 were

I. a capstone group scenario conducted during the Summer PEEC session at NDSU
II. an exit exam given at the end of the final semester
III. grades of C or higher in all core classes
IV. a semester project+presentation in some of the engineering/math clases

It was decided that I) was too inconsistently attended to provide a robust measure, and that III) wasn't an adequate measurement tool. Furthermore, success rates in the program were poor. To address these concerns, there were several planned responses. These proposals, along with their subsequent outcomes, are outlined here:

1. **Proposal:** Implement I) , the group capstone project, at SBC. **Outcome:** This proved unsuccessful, for several reasons. One, there weren't enough enrolled and actively engaged students to form meaningful groups. Two, the students were so burdened with the difficulty of the coursework that they chose not to make time for something that didn't impact their grade or their ability to graduate. There is thus no data to share. While such a capstone project would be valuable, it is not clear how to best implement such a measure moving forward.

2. **Proposal:** The creation of an integrated first-semester cohort experience for students that would focus on building resiliency, study-skills, and student relationships. **Outcome:** There were some positive results from this, but this effort ultimately dissolved in the face of inadequate results after a few iterations. It is unclear that this effort has had any lasting effect on student success rates. There is no engineering-program-specific data to share.

3. **Proposal:** Create a cross-TCU qualitative assessment designed to measure the emotional intelligence, motivation, coping skills, understanding of the profession, etc. of the students. **Outcome:** While the SBC instructor worked with personnel at NDSU to design a metric, implementation of the assessment by other TCU instructors was lacking, and insufficient data was collected.

4. **Proposal:** The creation of a mastery-based math sequence. **Outcome:** While in some capacity this is formally still in place, it has proven unsuccessful, and there are no substantive results to demonstrate that such a sequence improved students' math competency. Only one engineering student has participated in this sequence. They are currently on their 3rd attempt at making it through Precalculus, and in general their math skills are fairly weak. Of course it's not clear

whether their math competency was positively or negatively impacted by the mastery-based sequence. As such there is no meaningful data to share.

5. **Proposal:** The exit exam should be given at the beginning and end of each semester. **Outcome:** This was attempted a few times, but since many of the students take classes from other PEEC instructors at other TCUs, it was not always possible to track down students and have them take the tests. This issue is further exacerbated by that fact that their grades, funding, and ability to graduate are note contingent upon taking such a test. Furthermore, the test as designed is a flawed metric, as incoming students are unlikely to answer anything, meaning that any post/pre improvement is inevitable regardless of the strength of the program. The exam hasn't been given in several years, and the only relevant data (from 2016-2018) shows mild improvement from semester to semester for a small number of students.

6. **Proposal:** Expand IV), the semester project and presentation, to be a larger % of course grades. **Outcome:** This is still a valuable measurement tool, though other PEEC instructors choose not to implement it. Thus, unless the SBC instructor is teaching the course, there is no data. Hence, the data here is very incomplete.

The 2017-18 report showed a minor amount of promise with some of the proposed metrics, but in 2018-19 there was a major deficit of information, with the only salient data being small sample-size gains in the exit exam. As a result of personal health issues for the Pre-Engineering Instructor, in combination with COVID-related issues, 2019-20 assessment data was not collected and a final summary report was not filed in 2019-2020.

It is clear that the Pre-Engineering Instructor has done a sub-optimal job of compiling and analyzing program assessment data, and in constructing meaningful metrics. Future success and integrity in the program will require that they improve in this regard.

E. Institutional Support

Facilities, equipment, and library resources were ample. The grant-provided professional development funds and opportunities are abundant and not problematic. The fundamental issues related to institutional support are related to student support, of which two are most important. These have not changed since the prior 5-year report, and are as follows:

i) The policies of the financial aid office prohibit offering student stipends and allow the grant funds only to be used to match a student's minimal financial aid needs. Given that the Pre-Engineering program is among the most difficult on campus, as regards the difficulty and time-commitment of coursework, the ability to provide ample financial support for students is critical. Worrying about whether they have to work a job to pay rent, day-care, cell-phone bills, etc. are serious blows to their ability to succeed in the program, as evidenced by numerous conversations with students with whom the instructor has developed good relationships; such concerns are a significant factor in the lack of retention. The other institutions in the PEEC collaborative have policies that allow for student stipends, and while there is no proof it is nonetheless plausible that this fact contributes to the differentially greater success of the other PEEC institutions in recruiting and retaining students in the program.

To some extent this concern has been mitigated in the past though offering contractual work to some of the students for 5-20 hours/week. The work has often taken the form of tutor/mentor training,

assistance with outreach activities, and the development of course materials. Such work does provide additional income while also providing a work environment that facilitates their student development as engineers. Nonetheless, it would be significantly better to offer scholarships or stipends, so that the student could spend this time studying rather than being obligated to perform service tasks for the college. While this form of financial aid has been heretofore disallowed, perhaps there is some way to make it allowed in the future. Perhaps the contract work could be reformulated in such a way as to allow the student to spend the paid time on their coursework, if this is allowed within ethical and legal guidelines.

ii) The lack of tutoring services is problematic for students. The small student numbers often result in class sizes of one, so working with other students on homework is not an option, and furthermore the coursework is sufficiently advanced mathematically that no real tutoring services exist on campus. There may be no way around this as long as student enrollment is low, and the SBC pre-engineering instructor therefore is required to offer substantial assistance outside of class, which has been done consistently thus far.

iii) SBC supports professional development in multiple ways. The college encourages and provides funds for the attendance of conferences and workshops related to engineering education, STEM education, and a variety of other topics. Travel to meet with other PEEC instructors (aside from periods of COVID-restricted travel) is also encouraged and supported.

F. Obstacles / Previous Findings

Primary obstacles are the same as in the previous 5-year report:

i) Students do not receive adequate preparation in primary schools. None of the students entering the program were close to being adequately prepared for the rigors of the program, despite many of them having very good grades in STEM related classes. While intensive coaching and remediation can bridge the gap somewhat, it is unclear whether 2 or 3 years is enough time to both bridge the incoming gap and also get students properly through the coursework.

ii) Community support is low. Like many college programs, some community members embrace the program as an unmitigated good, while others regard it (with some justification) as a brain-drain that gives the best and brightest young people paths to leave the local community. Mitigating this latter concern could perhaps be accomplished through creating a successful history of service learning projects in the community, though a prerequisite is to have students enrolled in the program.

iii) Relationships with primary schools are weak. The majority of the most capable high school graduates do not attend SBC, instead being recruited by other institutions. Working to strengthen the relationship between SBC and local schools could help to educate the community on the strength of the educational programs here, including the Pre-Engineering program. There is no quick solution to this, other than lots of ongoing work in relationship building. There are currently no strong examples of this, and it remains an important and imperative goal for future work.

G. Other

G.1 - Contributions

The program has expanded the course catalog in ways that benefit non-engineering students. Classes such as PreCalculus, Calculus, C++ Programming, and Environmental Statistics have been taken by non-engineering students, and are only possible because of the Pre-Engineering program.

The engagement of the Pre-Engineering faculty and students with AISES (American Indian Science and Engineering Society) has promoted important community building, though the impact is difficult to quantify.

G.2 – Honors

Allen Hastings – accepted as a paid attendee of the 2019 AIHEC Advanced Manufacturing Summer Institute

Wesley Craddock, Allen Hastings, and Silas Little Dog – awarded 2020 NASA Summer Internships

Josh Mattes – 2018-19 AICF Faculty Member of the Year @ SBC

G.3 – Cocurricular Activities

Althea Fox, Allen Hastings, Courtney Lewis, and Josh Mattes attended the 2019 AISES (American Indian Science and Engineering Society) National Conference, participating in many different workshops and professional networking opportunities. Allen Hastings has served officer roles in the SBC AISES Chapter.

Josh Mattes served on the Research Committe, and also on the Integrated First Semester Experience Project for several semesters.

3. PROGRAM PLANNING

A. Trends Impacting Program Goals

A1 - Funding
The PEEC-PtiPS funding has concluded. Thus, during the next 5-year period funding will need to come from other sources. While there appears to be sufficient funding sources for the Pre-Engineering instructor's salary, it is not clear there will be sufficient funding for student travel and participation. In response to this:

- new funding sources must be researched and utilized
- employment of the students by the program may need to transition to traditional work-study arrangements
- the travel component of the program may need to be restructured. However, this restructuring was in some sense forced upon the program due to the pandemic, discussed next.

A2 – Pandemic related changes
The pandemic forced classes to go online, which presented no difficulties to the Pre-Engineering program. All of the core classes were already held as synchronous online classes that students could attend either in designated IVN rooms on campus, or from their own computers at any internet-capable location. In this sense the pre-engineering students had a big head-start.

The one modification that was forced upon the program, however, was the prohibition of travel. This of course prevented the attendance of our monthly in-person meetings, where all the students and instructors met for office-hours, coursework, and general community/cohort building. These have been replaced by weekly video-conference meetings for the instructors, and weekly (or bi-weekly) cohort-building and support sessions for the students via Zoom. Attendance of these sessions has been pretty good, and they seem to hold value for many of the students.

If there is a deficit of funding for travel in the future, this online form of cohort-building may become the default.

B. Articulation Issues

There do not appear to be any issues here. There have been no issues with transfer credits to other institutions in the 10 year history of the program, and there is no reason to suspect this will change in the future. This is primarily due to how closely we mirror the curriculum after the engineering curriculum at NDSU.

C. Revised Goals / Objectives

There are four primary goals that have been identified through this review process:

1. The drafting and *implementation* of program assessment measures that are not only meaningful, but also consistent from year to year. A 1-year goal will be to draft the measures for the 2021/22 academic year, and a 5-year goal will be to implement them consistently each year and conduct meaningful trend analysis.

2. The enhancement of program recruitment. A 1-year goal is to establish relationships with the science and math instructors at all the major area high-schools, and to conduct site visits once the pandemic is more controlled. A 5-year goal is to increase average attendance from 3.9 students per semester to 6 students per semester.

3. Enhance outreach activities. A week-long summer robotics camp at SBC was held in 2017. It is a short-term goal to hold another such summer camp as soon as the pandemic allows for it. A long-term goal is to implement an engineering-themed summer workshop/camp consistently each summer.

4. The formulation of an effective way of implementing a group capstone experience into the program, actually implementing it by year 5. It is not currently clear to what extent this will need to involve curricular change. The issue will be explored with the curriculum committee.

D. Additional Resources Needed

1. As mentioned in Section A above, there may be a need for newer funding sources for student travel and participation funds (for attending conferences, workshops, etc.). The PEEC collaborative is currently exploring various grant possibilities to enhance funding.

2. The ability for students to receive stipends (in excess of their calculated financial need) would likely help recruitment and retention (for reasons identified earlier), though this is an SBC policy decision rather than a resource deficit.

3. A separate engineering lab space would be helpful, and it appears that the NASA MIRO grant is able to fund such a space. If such a lab space materializes, additional resource needs may be identified.

4. It would be helpful for math and engineering students to have Wacom tablets that they could use in lieu of pencil/pen for online office hours and tutoring. They are in the neighborhood of $70 each. (Typical phone/tablet/laptop touch-screens don’t offer sufficient sensitivity to write equations etc.).