

Northwest Commission on Colleges  
and Universities

Mid-Cycle Self-Evaluation Report

**Montana**Tech

Submitted by  
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# Preface

## Institutional Overview

Originally chartered as The Montana State School of Mines, Montana Technological University (Montana Tech) has evolved into a dynamic institution composed of two colleges and two schools (College of Letters, Sciences, & Professional Studies; Highlands College; School of Mines and Engineering; and Graduate School); and the Montana Bureau of Mines and Geology.

Montana Tech traces its roots to the Enabling Act that granted statehood to the people of Montana. In that act, the United States Congress set aside 100,000 acres to establish and maintain a school of mines. In 1900, the Montana State School of Mines opened its doors. In 1965, the school underwent a name change to the Montana College of Mineral Science and Technology. On January 21, 1994, the Board of Regents adopted a plan to restructure the entire Montana University System followed by adoption of a resolution on July 6, 1995, initiating a second phase. This restructuring created the Montana University System and gave the college its new name, Montana Tech of The University of Montana. It also assigned to Montana Tech what had been the Butte Vocational-Technical Center and what is now known as Highlands College.

In May of 2017, the Montana Board of Regents (BOR) approved a fourth institutional classification for higher education in the state. The new classification, Special Focus Four-Year University, was given to Montana Tech, the only unit in Montana with this designation. In May 2018, the Board of Regents approved a new formal name for Montana Tech, Montana Technological University.

Today, Montana Tech is recognized among America's best values in undergraduate education. Montana Tech possesses an internationally esteemed, century-old tradition of excellence in higher education.

Montana Tech offers programs of distinction. For example, Montana Tech is one of ten U.S. schools that offer a B.S. degree in metallurgical engineering; one of nineteen that offer a B.S. degree in mining engineering; and one of only twenty that offer a B.S. in petroleum engineering. A number of Montana Tech graduates have risen to positions of leadership in resource and energy industries. World-class offerings in resource engineering are today complemented by an expanded array of programs in other areas of engineering, the sciences, mathematics, computation, health, business, and communication.

Montana Tech offers degree programs at the doctoral, masters, bachelor, associate, and certificate levels. The student body presents a national and global snapshot with over 43 states and 16 foreign countries represented.

All programs derive a special character and emphasis from the unique setting and continued tradition of high quality that has characterized Montana Tech since its founding. Montana Tech has a long-standing reputation for producing outstanding graduates.

Montana Tech's commitment to research has resulted in an unprecedented growth in its funded research over the last several years. The institution's funding base has diversified to include local, state, and national support from the private sector and government. Undergraduate and graduate students collaborate with faculty and staff in research programs.

The Montana Bureau of Mines and Geology (MBMG), the geologic and hydrogeologic research arm of the State of Montana, is a department of the institution. The MBMG provides service to the public and a variety of constituents within the private sector and federal, state, and local governments. The MBMG develops, gathers, analyzes, catalogs, and disseminates information concerning the location and development of the mineral, energy, and water resources of Montana.

## Update on Institutional Changes Since Last Report

In May 2018, the Montana Board of Regents approved the school [name change](#) from “Montana Tech of the University of Montana” to “Montana Technological University”. The name change resulted from the efforts of the Workgroup for Institutional Realignment for Excellence (WIRE) to define what it means to be the only Special Focus Four-Year University in the state.

There have been a number of leadership changes since the Year One Report submitted February 23, 2018. Dr. Donald Blacketter retired from Montana Tech effective June 30, 2019. After a national search, Dr. Les Cook became the 12<sup>th</sup> chancellor in Montana Tech’s history on July 1, 2019. Dr. Steve Gammon replaced Dr. Douglas Coe upon his retirement on June 30, 2018, as the new Dean of the College of Letters, Sciences, and Professional Studies (CLSPS). The Vice Chancellor of Administration and Finance (VCAF) position has been vacant since July 1, 2019. The duties of the VCAF have been distributed among current senior level administrators. A search for the VCAF is being chaired by the Provost in spring 2020.

In April 2019, Montana Tech’s Provost and Accreditation Liaison Officer (ALO), Dr. Douglas Abbott, notified the campus he would be stepping down as Provost and returning to a faculty position in the Business and Information Technology Department. In the fall of 2019, Montana Tech began a national search for the next Provost. CLSPS Dean Steve Gammon was selected for the position of Provost and Vice Chancellor for Academic Affairs and began serving in that capacity on February 1, 2020. The nationwide search for a new Dean to replace Dr. Gammon is currently underway, with Nursing Department Head Karen Vandaveer serving as the interim Dean of CLSPS through June 30, 2020.

## Part I: Overview of Institutional Assessment Plan

**Describe/explain your process of assessing mission fulfillment. Who is involved in the assessment? Is the Board of Trustees involved?**

Following our NWCCU Year Seven Visit, the assessment process was revised. Our NWCCU Steering Committee was expanded to include more people with specific expertise within our four core themes. Efforts were made to include a cross-functional team from both academic and non-academic units on campus, to assure that assessment will maintain an institution-wide focus for continuous quality improvement. The Steering Committee also includes representatives from multiple campus committees including the Executive Team, Dean’s Council, Budget Committee, General Education Committee, Faculty Senate and other standing committees. In addition, representatives from Information Technology, the Library, Physical Facilities, Institute for Educational Opportunities, and Public Relations all sit on the Steering Committee. Current NWCCU Steering Committee members are listed on our website with other accreditation information: (<https://www.mtech.edu/about/accreditation/steering.html>).

The Steering Committee reviewed the Core Themes, Objectives, and Indicators of Achievement to assure they were all aligned and measured our institution’s intended impacts. Under the expanded

NWCCU Steering Committee, the Core Themes were affirmed, but the Objectives and Indicators of Achievement were revised. Academic and non-academic programs at Montana Tech participate in regular, systematic reviews that include both direct and indirect evidence of student outcomes. These program reviews are designed to be a collaborative and inclusive assessment of the programs, with both internal and external constituents providing feedback during the evaluation process, which includes action items for underperforming programs.

To assist departments in the development of their Assessment Plans, a template was devised to provide programs with the required elements of a complete program assessment, while allowing the flexibility to adhere to external accrediting agencies to avoid unnecessary duplication of effort. Programs submitted their plans to their respective Deans and Vice Chancellors for review and feedback to assure assessments included high-quality performance indicators and metrics.

After the Assessment Plans were reviewed, an assessment reporting template was crafted and approved by the Dean's Council and the NWCCU Steering Committee. The intent of this reporting template was to standardize the results being reported by departments for use in assessing Indicators of Achievement that are aligned to Core Theme 1, and also to ensure that departments discussed and reported on activities such as advising, recruitment, enrollment, faculty engagement, and other Indicators of Achievement as part of their program review process. All programs were reviewed in Academic Year 2019 to test and continue to refine the templates; beginning in 2020, programs will be reviewed every other year on an alternating basis, with a few exceptions among select non-academic programs.

Core Themes 2 through 4 use additional performance indicators and metrics to measure program objectives. The Montana Board of Regents Performance Based Funding Metrics and the Complete College America "Game Changers" metrics are incorporated into Indicators of Achievement, as is information from standardized tests, surveys, faculty review processes, and other national benchmarking programs.

Individual departments submit their program review reports to their respective Dean, Director, or Vice Chancellor, who reviews them for completeness and accuracy. From there, the Director of Institutional Research aggregates the data from the individual programs to determine whether departments met their target of 75% of student outcomes having been satisfied. The NWCCU Steering Committee reviews all the Indicators of Achievement to determine: 1) next steps; and 2) institution-level action steps and priorities to ensure that the institution continues to engage in quality improvement processes. The resulting report will be presented to the Leadership Team and the Executive Committee prior to finalization. The Office of the Commissioner for Higher Education also receives the report, and they act in lieu of a Board of Trustees for the institution.

### **Are your core themes and objectives still valid?**

Montana Tech's Core Themes and Objectives presented in the Year 1 Report are valid and aligned to *Montana Tech's Strategic Plan – A Commitment to Excellence*. Our core themes were further ratified by the results of two transformational processes that have taken place over the past two years: namely, the Program Prioritization Process and the Workgroup for Institutional Realignment for Excellence (WIRE). WIRE made four recommendations that are closely aligned to the core themes independently from the NWCCU Steering Committee. We view this result as validation that our core themes are systemic themes that hold the key to our institution's future.

The results of the Program Prioritization Process and the WIRE efforts were presented to the BOR in March of 2018. The work of these two committees culminated in a single document entitled the *Montana Technological University Alignment Plan*, which can be located at the following link: (<https://www.mtech.edu/academics/provost/Program-Prioritization-Documents-12-14-2018-final-acc.pdf> ).

**Is the institution satisfied that the core themes and indicators selected are providing sufficient evidence to assess mission fulfillment and sustainability? If not, what changes are you contemplating?**

While the NWCCU Steering Committee is satisfied that the core themes and indicators provide sufficient evidence to assess mission fulfillment and sustainability, we also know that upcoming institutional changes require careful monitoring to assure that this remains the case.

According to Board of Regents Policy 219, Montana Tech's Mission, Vision, and NWCCU Core Themes were presented to the BOR during the 2019-20 Academic Year (<https://mus.edu/board/meetings/2019/Sept2019/ARSA/184-1501-R0919.pdf>). The BOR reviewed Montana Tech's mission in 2017, at which point Montana Tech's classification changed from a regional/comprehensive Montana university to a state-designated "Special Focus" institution (see the Special Focus Update: <https://mus.edu/board/meetings/2017/May2017/ARSA/MTTechUpdate.pdf> and Mission Parameters document: [https://mus.edu/board/meetings/2017/Mar2017/ARSA/BoardGov\\_MissionParam.pdf](https://mus.edu/board/meetings/2017/Mar2017/ARSA/BoardGov_MissionParam.pdf)). It is under this new designation that the WIRE Committee was established to determine how the designation would be applied to Montana Tech. Program Prioritization brought together stakeholders to make recommendations for realignment of academic programs across campus, specific to this Special Focus. Multiple members of WIRE served on the Program Prioritization committee, so while the two committees had some separation, there was an alignment of their charge and how they presented results.

In July of 2019, Montana Tech installed a new chancellor, a situation which provides another opportunity for the campus to consider its mission and vision. We anticipate the development of a new strategic planning process that will revisit our Mission, Vision, and our Core Themes. While the NWCCU Steering Committee is confident that the Core Themes are valid at this time, we understand that we will need to continue to evaluate the themes during this leadership transition.

The NWCCU Steering Committee recognizes that we have only completed one review cycle in which to assess the Core Themes, Objectives and Indicators of Achievement as of this writing. A second cycle will be completed by November 2020 and we will have a stronger sense of whether we have sufficient evidence of mission fulfillment and sustainability once that process has been completed. Based on feedback received as departments have completed their program reviews, we provided additional institutional information to departments to assist them, including reports on research productivity, enrollment and retention data, and other items that were frequently requested. The Steering Committee will be supplying such institutional information earlier in the future, rather than on-demand. Standardizing the information will strengthen assessment and evaluation of mission fulfillment.

## Part II: Two Representative Examples of “Closing the Loop” on Student Learning Assessment

### Example 1: Accelerating student completion of college-level mathematics course

This example relates to the Montana Tech Core Theme of Student Achievement and the objective “Students make adequate progress towards their Montana Tech degree”. This example is also related to the objective “Provide the needed lower-level, credit-bearing courses, that enable students to succeed in bachelor’s programs and complete degrees in a timely manner” from the Montana Tech Strategic Plan. Many Montana Tech STEM degree programs assume that students will be ready for Calculus 1 upon enrolling. However, students who place into developmental mathematics will complete three and five prerequisite mathematics courses before Calculus 1. Consequently, many STEM students have difficulty completing an undergraduate program in four years. In an effort to streamline student progress through the mathematics sequence, the Department of Mathematical Sciences collected student performance data and feedback from students, advisors, and department heads.

In the summer of 2015, the Department of Mathematical Sciences began testing ways to accelerate students through developmental mathematics. We created a five-credit course called *M 121E* for students who were not ready for college-level mathematics. The course combined material from our College Algebra (M121) and Intermediate Algebra (M095) courses and was required for students who were not ready for Calculus I. Ultimately, only 44% of students enrolled in *M 121E* passed. The feedback we received from students and academic advisors focused on a couple of key issues.

1. If a student needed to drop the 5-credit *M 121E*, the student often fell below the minimum 12 credit course load required for full-time student status.
2. The *M 121E* course covered all of the topics in the developmental course, instead of focusing on topics where students had deficiencies.
3. The small enrollment in *M 121E* meant that there was only one section offered each semester.

In the fall of 2016, Montana Tech and other institutions within the Montana University System began working with Complete College America on co-requisite courses for both math and writing. The goal of a co-requisite course is to support students that place into developmental math or writing courses. In a co-requisite model, a student enrolls in the college-level mathematics or writing course and receives additional support. The Department of Mathematical Sciences co-designed with faculty members, advisors and department heads, a co-requisite offering for College Algebra (*M 121*), which was piloted in the fall of 2017.

During the pilot, students who placed into the developmental course were required to enroll in a one-credit lab that met two hours per week in addition to College Algebra. In the lab, students addressed skill deficiencies and prepared for assessments in the College Algebra course. Diagnostic assessments determined the prerequisite skills that we needed to address in the co-requisite lab. Students in the co-requisite lab worked in small groups and reflected on assignments completed for the college-level course. Students were able to enroll in any section of College Algebra that worked for them, so students who placed into the developmental course were enrolled in sections with those who were placed into College Algebra. The different structure allowed us to:

1. Reduce the credit load from 5 credits to 4 credits.



2. Cover only topics from developmental mathematics where students had deficiencies.
3. Allow students to register in any section of the college-level course.

During that first semester, 19 students enrolled in a section of College Algebra and a co-requisite course. Two of the 19 students withdrew for personal reasons not related to their course performance. Of the remaining 17, all but one passed College Algebra. The student who did not pass was not attending either the lab or the class. Table 1 below summarizes the average test scores for students enrolled in the co-requisite lab and those students not enrolled in the lab.

*Table 1: Test and course averages for students enrolled in fall 2017 pilot co-requisite course*

	Test 1 Average	Test 2 Average	Test 3 Average	Test 4 Average	Average Course Grade
Students enrolled in co-requisite	80.85	80.39	85.54	84.20	84.70
Students not enrolled in co-requisite	71.9	71.92	83.32	70.99	74.46

Students in the co-requisite lab outperformed the students that placed into College Algebra on every exam and on the final grade in the course. Of the 66 students enrolled in only College Algebra, eighteen (27%) did not pass the course. Approximately 6% of the co-requisite students did not pass. Students and advisors responded favorably to the course.

In the fall of 2018, two sections of the co-requisite for College Algebra and one section of the co-requisite for Contemporary Math were offered. The Department of Mathematical Sciences has collected and analyzed three semesters of data (see Table 2). The data indicates that 71.60% of students enrolled in a co-requisite laboratory for either course passed the college-level course without taking a prerequisite developmental course. Over the same time period, 64% of students in M 121 and M 105 who were not enrolled in the co-requisite passed the course. Our results mirrored the data collected in other states by Complete College America.

*Table 2: Passing percentage for co-requisite students*

Course	Percent of students in the co-requisite who passed the college-level course
M 121 (N = 67)	73.13% (N = 49)
M 105 (N = 14)	64.29% (N = 9)

While the co-requisite model was being piloted and analyzed, students had two additional paths for developmental mathematics where students completed the developmental work prior to enrolling in the college-level mathematics course. Based on the successes in the pilot and alignment of our findings with larger national studies, the Department of Mathematical Sciences eliminated these other paths in favor of co-requisites. At each step in the process, the Department of Mathematical Sciences has communicated results to deans, department heads, and advisors.

We continue to collect data on student success in not only the first college-level course, but in subsequent courses as well. Only thirteen of the students from the first three semesters of co-requisite offerings have enrolled in a subsequent mathematics course. Six of those thirteen passed the subsequent mathematics course. We will continue to collect and analyze data as our sample size

increases, to determine if student success in subsequent mathematics courses mirrors the initial outcomes shown in the current college-level course.

## Example 2: Mechanical Engineering

### Background

All undergraduate academic degree programs utilize an assessment process focused on graduate success and continuous improvement. Table 3 defines the terms used in the process.

Table 3: Assessment terms defined

Term	Definition
Mission	A short statement of a program's purpose. What program is trying to achieve?
Program Educational Objectives - PEOs	What alumni attain a few years after graduation. Fulfills mission.
Student Outcomes - SOs	What students should know and are able to do at the time of graduation.
Performance Indicators - PIs	Specific, measurable statements identifying the performance(s) required to meet the SOs; confirmable through evidence. PIs provide clarity to the SOs.
Assessment Data or metrics	Data collected to conduct assessment.
SOs Assessment	Process that identifies, collects, and prepares assessment metrics to be used in the SOs evaluation. Directly measures attainment of PIs.
SOs Evaluation	Process of reviewing the SOs assessment results and making a determination of the value of findings and actions to be taken.
PEOs Review	Process of reviewing the PEOs to ensure they: 1) remain consistent with the program mission and the constituents' needs; and 2) graduates are prepared to achieve the PEOs.
Constituents	Students, alumni, industry, faculty

Referring to Figure 1 below, the center of the process is the *Program* which consists of the curriculum and Extra Curricular Activities (ECAs). The program output is the graduates who eventually become alumni and industry representatives. Continuous improvement is implemented via two feedback paths: one involving the student outcomes (SOs); and one focused on the program educational objectives [PEOs]. A complete cycle is conducted for both loops on a periodic basis, typically every two to three years. Results are reported every two years.

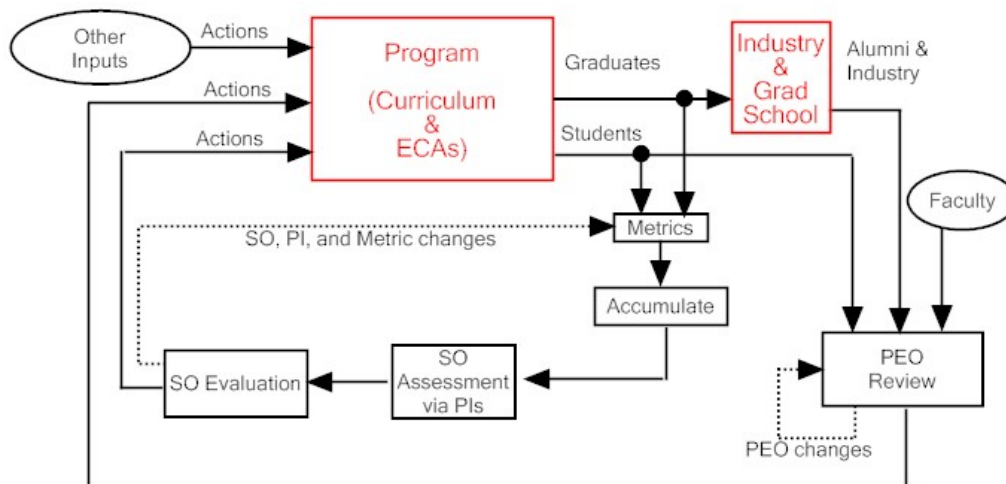


Figure 1: Assessment process

The inner loop focuses on the SOs. Metrics which measure student and graduate performance with respect to the SOs/PIs are accumulated over a period of time (typically two years). Once enough metrics are accumulated, the SOs are assessed based on the metrics and PIs. The assessment is then evaluated

by the program faculty. The outputs of the SOs' evaluation are used for continuous improvement. In the event of concerning gaps between expectation and achievement, faculty identify: 1) recommended "actions" to change the program curriculum or ECAs; and/or 2) changes to the SOs, PIs, and/or metrics for future assessments.

The outer loop focuses on the PEOs. Periodically (typically every two years), representatives of the constituents review the PEOs to determine if: 1) they are consistent with the mission and constituent needs; and 2) graduates are prepared to achieve the PEOs. The review is not based on formal assessment and metrics as it is very difficult to measure graduates three to five years past graduation. But, the PEOs review includes all SOs evaluation results and data as well as anecdotal data from the representative constituents. The outputs of the PEOs review are: 1) recommended "actions" to change the program curriculum or ECAs; and/or 2) changes to the PEOs.

The process also acknowledges other sources of input that can lead to changes to the program (which are also termed *actions*.) Examples of such factors include faculty composition, enrollment restrictions, and budget realities.

### **Mechanical Engineering B.S. Example**

How the above assessment process works can be seen through the example of the BS Mechanical Engineering (BSME) program. The BSME program is newly formed and has recently completed its first SOs assessment/evaluation cycle and PEOs review cycle. The program is housed within the Mechanical Engineering (ME) department, which offers both undergraduate and graduate degrees.

### **PEOs Review**

Since BSME is a new program, the first PEOs review cycle focused on the development of the department mission and BSME PEOs. A standing committee consisting of the Mechanical Engineering Industrial Advisory Board, program faculty, and BSME student representatives was formed during the 2017-18 academic year. This PEOs Review Committee met during the 2017-18 and 2018-19 academic years and developed the following mission and PEOs.

*The mission of the Mechanical Engineering Department at Montana Tech is to:*

- *Provide students an education based in the fundamentals of engineering, mathematics, and science in order to prepare graduates to enter and continue the practice of Mechanical Engineering at the professional level. Our foci are in Mechanical and Material systems, applications, and processing.*
- *Provide a comprehensive education to enable graduates to solve advanced problems in the areas of Materials, Sensors and Actuators, Nanotechnology, Control Systems, Thermal Fluids, and Welding.*
- *Maintain sustained research programs that contribute to solving critical problems in the Design, Fabrication, and Characterization of Devices, Processes, and Materials.*

Note that the mission encompasses the entire department, which offers both undergraduate and graduate degrees. The foundation of the mission centers on fulfilling the institution's mission.

*The Program Educational Objectives of the BSME program are designed such that three to five years after graduation, graduates from the program are prepared to:*

1. *Attain the successful practice of the Mechanical Engineering profession as demonstrated by:*
  - a. *continued professional employment;*
  - b. *expanding career responsibility; and*
  - c. *job promotion.*
2. *Seek lifelong professional advancement through endeavors such as:*
  - a. *active membership in technical societies;*
  - b. *engineering volunteerism;*
  - c. *continued education; and*
  - d. *professional licensure.*
3. *Complete an advanced degree.*

The PEOs focus on the BSME program only. In large part, the BSME curriculum is built to enable graduates to attain these objectives. The PEOs are listed in the college catalog and on the department's website.

The PEO Review Committee is scheduled to meet again during the 2019-20 academic year to review the PEOs. The review will focus on gauging if: 1) the PEOs remain consistent with the program mission and the constituents' needs; and 2) graduates are prepared to achieve the PEOs.

### **SO Assessment and Evaluation**

The BSME SOs were developed by the ME department faculty following guidelines from the Accreditation Board for Engineering and Technology, and through consultation with the Dean. The program SOs are:

*Students graduating from the BSME Program at Montana Tech will attain:*

1. *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*
2. *An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*
3. *An ability to communicate effectively with a range of audiences.*
4. *An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal context.*
5. *An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.*
6. *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*
7. *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*
8. *The knowledge and application of basic science, advanced mathematics including multivariate calculus and differential equations, and principles of engineering; to model, analyze, design and realize physical systems, components, or processes.*
9. *The knowledge in either thermal or mechanical systems to work in these areas professionally.*

Four metrics are used to measure attainment of the SOs:

- Course Work (CW) – specific work in a class or the overall final grade in a given class.

- Fundamentals of Engineering (FE) exam results.
- Educational Testing Service (ETS) exam results.
- Graduate Exit Survey (GES).

Also, each SO is broken into measurable PIs and the metrics are used to assess attainment of the PIs. Table 4 below shows the PIs and associated metrics. For example, SO 3 is broken into two PIs: a) “Written communication,” which is assessed using CW and ETS metrics; and b) “Oral communication,” which is assessed using a CW metric.

*Table 4: Student Outcomes Performance Indicators for Mechanical Engineering*

SO	Performance Indicator (PI)	Metric			
		CW	FE	ETS	GES
1	a. Apply non-ME general engineering knowledge	X			
	b. Identify, formulate, and solve engineering problems by applying principles of engineering, science, and math	X			
2	a. Apply engineering design to produce solutions that meet specified needs	X			
3	a. Written communication	X		X	
	b. Oral communication	X			
4	a. Understand professional and ethical responsibility	X	X		
	b. Understand engineering economics	X	X		
	c. Understand global, societal, and environmental issues	X		X	X
	d. A knowledge of contemporary issues	X			X
5	a. Have and apply non-ME engineering knowledge	X			
	b. Demonstrate an ability to function in a team	X			
6	a. Design and perform experiments, as well as analyze and interpret data	X			
7	a. A recognition of the need for, and ability to engage in, lifelong learning	X	X		X
8	a. Have and apply knowledge of calculus	X	X		
	b. Have and apply knowledge of differential equations	X			
	c. Have and apply knowledge of modelling	X			
	d. Have and apply knowledge to design, analyze, and realize physical systems, components, and processes	X	X		
9	a. Have and apply knowledge of thermal systems	X	X		
	b. Have and apply knowledge of mechanical systems	X	X		

Each combination of PI and metric has an expected level-of-attainment as defined in Table 5 below. For example, SO 3 uses CW as a metric for assessment. If student grades average between 75% and 90%, this performance is assessed as “meeting the target.” The FE exam applies the commonly-used measurement of the “ratio score,” which is the ratio average grade on a specific component of the FE exam for Montana Tech students versus the national average.

Table 5: PI and Metric combinations

Assessment Metric	Assessment Scale	
Course Work	< 75	% Under Target
	75 - 90	% Target
	> 90	% Exceeds Target
ETS Exam	< 50	% Under Target
	50 - 80	% Target
	> 80	% Exceeds Target
FE Exam	< 0.9	Under Target
	0.9 - 1.1	Target
	> 1.1	Exceeds Target
Graduate Exit Survey	< 75	% Under Target
	75 - 90	% Target
	> 90	% Exceeds Target

A full cycle of SOs assessment and evaluation was conducted in 2018-19 based upon metrics collected in 2017-18. It is beyond the space limits of this document to cover the details of all SOs: therefore, results for SO 3 are described. The concluding assessments and actions for all other SOs are also provided.

The following rubrics show two tables for SO 3: an assessment table (Figure 2) and an evaluation table (Figure 3). The assessment table was presented to the ME faculty at an evaluation meeting on November 7, 2018; and the ME faculty completed the evaluation table including the action items.

<b>Mechanical Engineering Outcomes Assessment Fall 2018</b>				
Evaluation Date:		11/7/2018		
Evaluation Performed by:		D. Prieto, S. Coguill, B. Pramanik, P. Lucon, J. Skinner		
<b>Outcome 3.</b> An ability to communicate effectively with a range of audiences.				
<b>Performance Indicator 3.a.</b> Written communication.				
<b>Performance Indicator 3.b.</b> Oral communication.				
<b>Evaluation Table</b>				
Performance Indicator	Metric		Aggregate Attainment Score	Evaluation (Excellent, Satisfactory, Unsatisfactory)
3.a.	ETS Exam, Course work	Average course grade, Specific material grade, ETS Exam	59	Unsatisfactory
3.b.	Course work	Specific material grade	84	Satisfactory
<b>Notes:</b>	Dept Mtg 11-5-18, combine EGEN 489 and 499. We reviewed the reports and all agreed they are borderline satisfactory (internationals) and satisfactory (native english speaking). Closer to borderline satisfactory. TOEFL scores were increased a few years ago, but we have not had these students through the program yet.			
<b>Actions:</b>	We want to wait to see if this is an actual trend and not a single data point. If the trend continues to be low, then we will address and perform actions. Possible actions would be to make technical writing at Montana Tech core classes or add more rigor in ME specific classes in writing.			
<b>Assessment Table</b>				
Metric Results for	Course or Test	Description	Score	Attainment
PI 3.a.	WRIT 321	Average Grade	88	Target
	EGEN 489/499	Project written report	75	Target
	ETS Exam	Writing Portion	13	Under Target
PI 3.b.	EGEN 434	Project oral reports	80	Target
	EGEN 489/499	Project oral reports	87	Target

Figure 2: Assessment Table



The final assessment and evaluation results for all SOs are provided in Figure 3, with proposed actions..

Student Outcome (SO)	PI	Evaluation	Action
1	1.a	Satisfactory	Replace Performance Indicator (PI) for EGEN 202 with PI for EGEN 305. Will be implemented on next cycle.
	1.b	Excellent	No actions required.
2	2.a	Satisfactory	No actions required.
3	3.a	Unsatisfactory	See if this is an actual trend and not a single data point. If scores remain low, make technical writing at Montana Tech a core class or increase writing rigor in ME specific classes.
	3.b	Satisfactory	No actions required.
4	4.a	Satisfactory	No actions required.
	4.b	Satisfactory	No actions required.
	4.c	Satisfactory	Reduce number of projects in EGEN 424 from 3 to 2. Give students more time to focus on non-engineering constraints.
	4.d	Satisfactory	No actions required.
5	5.a	Satisfactory	No immediate action. We have identified we may improve by adding a PI in EMEC 402 for a non-ME specific Lab.
	5.b	Excellent	Break up 306 and 336 into parts that will work for outcome 5 and others that work for outcome 6.
6	6.a	Satisfactory	Break up 306 and 336 into parts that will work for outcome 6 and others that work for outcome 6.
7	7.a	Satisfactory	Ensure out-of-department instructors record metrics when teaching classes for the Mechanical Engineering Program. Add EMEC 326, EMEC 455, and EGEN 434 to core classes. Add EMEC 402 metric.
	7.b	Satisfactory	No actions required.
8	8.a	Satisfactory	Add a PI for EMEC 445 for calculus based problems.
	8.b	Unsatisfactory	Make EMEC metric required for all students.
	8.c	Satisfactory	No actions required
	8.d	Satisfactory	No actions required
9	9.a	Satisfactory	No actions required
	9.b	Satisfactory	No actions required

Figure 3: Evaluation and Action Table



## Part III: Analysis of Part I and Part II

### **Moving forward to the Year Seven what will you need to do?**

#### **Planning and Implementation**

Institutional planning will be systematic and inclusive with the Executive Team, Cabinet/Leadership Team, Dean's Council, NWCCU Steering Committee, and Budget Committee. Moving forward to Year 7, the Strategic Plan and Campus Master planning process will begin. Prior to initiating these broad-based initiatives, the leadership of Montana Tech determined they would focus their immediate efforts on enrollment, student success, marketing and messaging, campus infrastructure and environment. As a result, Montana Tech established five campus-wide teams to assist in these endeavors. All of these committees are providing insight and additional information applicable to at least one core theme. The teams and their responsibilities/charge follow:

#### **Recruiting Team**

##### **(charge: Core Theme 4 - The Montana Tech Community)**

The Recruiting Team shall review all current and former recruiting practices at Montana Tech. The team will review recommendations from consultants, university committees, and previous recruiting strategy reports. They will explore progressive and impactful practices at peer institutions as well as those recognized nationally as leading-edge and evaluate what may be beneficial to Montana Tech.

#### **Student Success Team**

##### **(charges: Core Theme 1 - Education and Knowledge; and Core Theme 2 - Student Achievement)**

The Student Success Team will examine student success/retention and graduation rates of undergraduate students at Montana Tech with the goal of increasing both. The team will review data from Montana Tech and other sources to identify and document the types of issues that contribute to retention and graduation. They will review policies, practices and structures that improve student success outcomes. They will summarize past reports/recommendations related to student success as well as provide examples of evidence-based practices that have been successful. They shall recommend innovations to improve retention and graduation rates.

#### **Marketing/Communication Team**

##### **(charge: Core Theme 4 - The Montana Tech Community)**

The Marketing/Communication Team is reviewing all marketing, recruiting, and outreach materials for Montana Tech. These include print materials, websites, advertisements, application technologies and social media sites. Through the process of inventory, identification, assessment, and planning the team will address the following questions: What is Montana Tech's identity and where is it known? What are our differentiators and how do we leverage and capitalize on them? Who has not yet heard about or experienced the influence of Montana Tech, but should?

#### **Campus Refresh and Space Planning Team**

##### **(charges: Core Theme 2 - Knowledge and Student Achievement; and Core Theme 4 - The Montana Tech Community)**

The Campus Refresh and Space Planning Team is charged with leading a space audit to identify campus infrastructure needs as well as an assessment of usage capacity with the goal of creating efficient and effective use of existing campus space. This initial assessment will provide the foundation for the development of a progressive and realistic campus master plan. It is anticipated the space audit/evaluation with recommendations will be completed by mid-March 2020. The team will also focus on

exploring possibilities to enhance and freshen up existing space to create a welcoming, inclusive and pleasing environment.

### **LEAD Team**

#### **(charge: Core Theme 3 - Engaged Faculty)**

Beyond the four teams identified above, an additional campus-wide team composed of both faculty and staff is engaged in developing professional development training. These initiatives include facilitated book group discussions, workshops, and team-building activities. It is anticipated that these initiatives could lead to the establishment of a formalized center for teaching and learning at the University.

The recruiting, student success, marketing/communication and campus refresh and space planning teams will have completed reports with prioritized recommendations submitted to the Chancellor and Executive Team by mid-March 2020. These recommendations will be evaluated and prioritized immediately with an implementation plan to follow.

### **Academic Planning**

In addition to the critical endeavors discussed above, Montana Tech is prepared to take the next step in embracing our Special Focus designation, as well as to act upon the recommendations of the Workgroup for Institutional Realignment for Excellence (WIRE). We are poised to continue meeting the ever-critical needs of our state, nation and the world in solving the most complex problems through our outstanding graduates and our research. Part of this readiness involves regularly reviewing our current academic offerings as well as consideration of others closely aligned with our special focus.

One example for examination is the expansion of our applied research enterprise through the addition of PhD programs in our areas of strength. We have identified two such areas: Earth Science and Engineering and Electrical Engineering - Power/Energy. These two programs are not readily available elsewhere and would give Tech a niche in these emerging areas of study. In addition, advancing Tech's research portfolio has great value for Butte and for the state. Montana Tech began offering a PhD in Materials Science in 2014, and over the past five years we have witnessed tremendous benefits including: over \$17 million in funding for advanced materials and manufacturing research from the Army Research Lab and other sponsors; a blossoming of undergraduate research; an increase in research and development expenditures, growth in intellectual property disclosures, and spin-off businesses.

Offering a PhD in Earth Science and Engineering builds on the existing engineering and science BS and MS programs already in existence and is a natural fit with the co-located Montana Bureau of Mines and Geology (MBMG). As it happens, our MBMG is the *only* state geological survey in the country that did not already have an aligned PhD program on the campus where it resides. This degree has been in the works since 2017 and includes commitment from over 20 faculty members across multiple disciplines. Currently there are two geoscience PhDs in the state: however, neither existing program integrates engineering. The integration of earth science and engineering complements rather than duplicates the existing geoscience and environmental programs at our sister institutions.

A PhD in Electrical Engineering – Power/Energy is currently under consideration for submission to the Montana Board of Regents in late 2020 or 2021. The demand for PhDs focused in electrical energy is significant, especially in the context of emerging challenges related to power grid reliability and stability; power plant and transmission security; and the integration of rapidly growing sources of intermittent renewable energy. An aging US electric infrastructure combined with substantial demand for renewable

energy sources and energy storage has created a significant demand for new technology solutions, an area in which Montana Tech has expertise.

The PhD in Earth Science and Engineering was approved by the Montana University System Board of Regents in March 2020.

### **Resources and Capacity**

Beginning in the summer of 2019, Montana Tech engaged the professional expertise of outside consultants to assist us in moving forward. A comprehensive review of recruiting and enrollment practices at Montana Tech was completed by Ruffalo Noel Levitz in September 2019. As a result of this report, Montana Tech is currently engaged with them in a number of endeavors to build a strategic enrollment plan, optimize financial aid and scholarships, and increase the yield of admitted students.

Complementary to our mission, vision, core themes and strategic plan will be a new campus master plan, a strategic enrollment plan, and a comprehensive communication and marketing plan. Development of these plans will occur concurrent with the strategic planning process.

The budget and planning process is delineated in Montana Tech's *Guidelines for the Budgeting and Planning Process* (<https://www.mtech.edu/administrative-services/budgets/files/montana-tech-budget-guidelines.pdf>). The process has been revised to reflect changes in the configuration of leadership teams. It is anticipated that additional adjustments may be forthcoming once a new Vice Chancellor for Administration and Finance is hired.

The space planning process for Montana Tech provides departments an opportunity to request space through the Dean's Council or their respective Vice Chancellor. The initial proposal is reviewed at this level with a recommendation made to the Executive Team. Recommendations are reviewed and discussed at the Executive Team level with final approval being granted by the Chancellor. This planning process will be modified to align with the strategic and master plans upon their completion.

### **Effectiveness and Improvement**

Beyond these near-term goals, Montana Tech will continue to be steadfast in moving forward to Year 7 in the assessment of core themes and mission fulfillment. With the implementation of a revised program review process, mission fulfillment has only been assessed once since Year 1. Moving forward, the campus will follow its 2-year assessment cycle. Throughout the cycles, there will be continued conversations about the indicators of achievement, objectives, core themes, resources, and space in order to adapt and ensure relevancy.

According to Board of Regents Policy 219, Montana Tech's Mission, Vision, and NWCCU Core Themes was presented to the BOR during the 2019-20 Academic Year. An ongoing and thorough review of all planning documents will commence in summer 2020 with the completion of a mission, core themes, vision and strategic plan to be completed in spring 2021.

The following timeline has been identified for planning purposes for the University.

<b>Plans to be completed</b>	<b>Planning timeframe</b>	<b>Completion date</b>
Enrollment Recovery Plan	September 2019 – June 2020	June 1, 2020
Marketing & Communication Plan	September 2019- September 2020	September 1, 2020
Strategic Plan	August 2020-May 2021	May 1, 2021
Strategic Enrollment Plan	January 2020- May 2021	May 1, 2021
Campus Master Plan	May 2021-January 2022	January 1, 2022
*Capital Campaign Plan	January 2022- December 2022	December 1, 2022

## Appendices

## Appendix A: Strategic Planning Framework

Some initial considerations for the strategic plan include the following framework:

### **Framework**

- We are ONE University- main campus, Highlands, Bureau
- Investment in **people** (faculty/staff/students)
- Investment in **programs** (academic & high impact niche)
- Investment in **potential** (building the culture) **and possibility** (meager beginnings to extraordinary)
- Investment in **performance** (outcomes/doing the right things right/high expectations)
- By the numbers 3330 – 3000 undergrad, 300 grad, 30 endowed chairs

### **What makes us distinctive?**

- STEM focus - premier STEM institution
- Special Focus
- Top value, high return on investment, social mobility
- Smart investment, affordable, low-cost
- High placement/social mobility
- Our location- Butte/history/charm, access to outdoors
- Experiential, hands-on, discovery-based learning

### **What makes sense for us to consider?**

- Intentional investment in the growth and support of people
- Closer alignment/synergies with Highlands, North campus, MBMG, embracing the fact that we are one University culture
- Energy focus - modernized extraction resources
- Health - being bold – STEM and possibly a college of health
- High tech - reinvention/transformation of computer science department
- Build and expand interdisciplinary options
- Explore possibility of cluster hires - cross-disciplinary
- Additional investment in IT infrastructure
- Expand graduate education in appropriate areas
- Growth in select online undergraduate/graduate degree offerings
- Robust partnerships to embrace 1+3/2+2 degree offerings
- Accelerated master's programs
- Long-term investment in aging facilities

### **Potential hallmarks of our plan:**

#### **Academic**

- Moving from extraction to energy focus
- Technological- investment in technology infrastructure
- Health sciences
- Computer science

- Growth in graduate programs at both the masters/PhD level
- Accelerated, online masters
- Embrace stacked credentials, badges, certificates and multi-disciplinary degree options
- Highlands- speed-to-market, job ready, workforce development
- Increased partnerships with industry

#### **Student experience/success**

- Creation of an ethos of care that permeates our work
- Highly visible, robust, academic advising model that employs best practices
- Enriched campus life programming model
- Enhanced campus entertainment options
- Additional athletic programs that are in demand
- Student well-being initiative
- Accessible, engaging and well-equipped outdoor program
- Expanded innovation & entrepreneurship opportunities
- Community engagement
- Additional Niche programs- Honors, learning communities, enterprise
- Develop international ex opportunities

#### **Infrastructure**

- Main Hall total renovation
- Library/learning commons
- Campus commons
- Realignment of academic space

**Appendix B: Recommendation 3** *The committee recommends that Montana Tech improve its comprehensive planning processes to more effectively collect and utilize data to inform these processes and to document the use of data in planning.*

At the May 2017 Montana University System Board of Regents meeting, the Board unanimously approved an update to Policy 219.1 on Institutional Mission Parameters; Montana University System. That update added a new institutional classification “Special Focus Universities,” placing Montana Tech in this classification and removing it from the group of “Regional Comprehensive Universities,” where it had been previously. This classification change (which is internal to Montana and does not affect the institution’s basic Carnegie Classification of “Master’s Colleges & Universities: Small Programs”), in combination with the NWCCU Seven-Year Peer Evaluation visit in April 2017 and enrollment and revenue declines triggered a major planning effort that included:

- The Work Group for Institutional Realignment for Excellence (WIRE)
- Program Prioritization Committee
- Revised program-based planning frameworks and cycles, designed to focus, tailor, and enhance the program self-evaluation processes and their value for mission fulfillment.
- Explicit and extensive incorporation of data informed these processes. To augment the internal data used in this planning, Montana Tech also joined the Delaware Study to have access to current program-specific financial and other information from the 174 four-year institutions participating in the 2017 study in an effort to nationally norm many of our activities.

**Work Group for Institutional Realignment for Excellence (WIRE) (Spring 2017 through October 2018)**

Chancellor Blacketter established WIRE in spring 2017 with 13 campus representatives spanning campus constituencies, and charged it with brainstorming and obtaining broad community input to define what it meant for Montana Tech to be Montana’s special focus institution, and how Montana Tech should operationalize this role. WIRE met approximately weekly over approximately 20 months, frequently joined by the Chancellor.

To inform its deliberations, WIRE obtained, evaluated, and extensively discussed national data, peer-institution data, and Montana Tech’s data. Data sources included the US Department of Labor, US Department of Education IPEDS, National Science Foundation Higher Education R&D (HERD) surveys, and STEM enrollment and completion data; campus data from a set of similar institutions; and internal Montana Tech data, such as enrollment, completions, research expenditures, and scholarly productivity by program and/or department.

WIRE organized and conducted numerous forums and meetings to share its progress and collect input and feedback, including:

- Eight campus-wide or community open forums and listening sessions;
- Meetings with each academic and administrative department; and
- Interactions with and collection of feedback from departmental Industry Advisory Boards, alumni, and students.



WIRE also met with Dr. Chris Maples from Missouri S&T. Prior to Missouri S&T, Dr. Maples had been the President of Oregon Tech, which - during his leadership term - had undergone an extensive program prioritization process due to major budget issues facing the institution in particular and the higher education system in Oregon more generally. Maples shared valuable information about how Oregon Tech had used data to prioritize programs and transform the institution, while remaining true to its mission and serving its community.

In addition, WIRE obtained input and insights in separate meetings with Montana's Commissioner of Higher Education, the new president of the University of Montana-Missoula, the director of academic policy and research in the Office of the Commissioner of Higher Education, and administrators at Gallatin College (the 2-year campus affiliated with Montana State University-Bozeman), among others.

After extensive discussions, WIRE developed specific recommendations, which were shared with the campus community and the Board of Regents, and accepted by the Chancellor and the Regents. WIRE's recommendations were as follows:

1. Changing the institution's name to "Montana Technological University" from "Montana Tech of the University of Montana," which was often interpreted by people unfamiliar with the campus to imply Tech is a 2-year technical school. This recommendation was officially endorsed by the Regents at their May 2018 meeting.
2. Adopting four recommendations embracing and defining Montana Tech's Special Focus:
  - a. Recommendation I: Montana Tech embraces the Special Focus designation as a premiere science and engineering institution dedicated to meeting the changing needs of society;
  - b. Recommendation II: Montana Tech will have a nationally competitive applied research culture;
  - c. Recommendation III: Our approach to curriculum will focus on integrated problem solving; and
  - d. Recommendation IV: Montana Tech will grow the STEM workforce in Montana and beyond.

Following a considerable period of sharing, reflection, and editing, WIRE released its final report in October 2018. This report provided a solid data-anchored foundation, along with an outline of metrics and directions for the subsequent major planning phase: namely Program Prioritization, which was driven by the combination of revenue issues due to enrollment decline and the need to align more faithfully with the special focus designation.

#### **Program Prioritization Committee (January 2018 through December 2018)**

The Program Prioritization Committee (PPC) was established in January 2018 and chaired by the Provost. Its initial members included the Vice Chancellors, Deans, and Registrar; four faculty members representing the Faculty Senate, non-union faculty, and both faculty unions; and a representative of the Staff Senate. As appropriate for the focus of specific meetings, other individuals, such as the Director of the Montana Bureau of Mines and Geology (MBMG) or Athletic Director, would be included. The work of the Committee was supported by the Director of Institutional Research as a non-voting *ex officio* member. Two representatives of the Associated Students of Montana Tech were added during fall semester. Two members of the PPC were also members of WIRE, an overlap which fostered coordination of work and communication between the two committees.

At the Committee's first meeting, the Chancellor issued the charge to the PPC and answered members' questions. The Committee was directed to engage in a comprehensive and transparent planning process to evaluate Montana Tech's academic and non-academic programs and activities in the context of their contribution to the campus mission, their quality and effectiveness, and their cost, using numerous metrics and data sources. The Committee was expected to take one pass through its scope during spring semester, do it again during fall, and then make recommendations to the Chancellor, who would make the final decisions. The output from WIRE, which was expected soon, was to inform the process.

Also at the first meeting, PPC brainstormed possible data, data sources, and metrics needed to understand and evaluate academic programs. The Committee developed numerous candidate metrics of interest that would be obtained from a combination of internal sources, IPEDS, and the *Delaware Study of Instructional Costs and Productivity* [for four-year programs] (<https://ire.udel.edu/cost/>). Montana Tech had joined the *Delaware Study* for the purpose of this planning effort in order to have a source of data for national ranges for different disciplines.

It should be noted that the Delaware Study metrics do not apply to the two-year programs at Highlands College. The similar study for two-year colleges is the "Kansas Study" (*National Community College Cost & Productivity Project*), which does not contain peer institutions similar to our small size, so we were unable to make a comparison to a national data set. Instead, we aligned the program effectiveness metrics using the faculty contract and standards documents and the performance-based funding matrix used by the Board of Regents. The metrics measured such parameters as enrollments, completions, faculty workload, research productivity and grant revenues, program demand, service across majors, advising, costs, student diversity, gaps affecting different populations, fundraising/donations, and numerous ratios comparing the parameters per faculty FTE, per student FTE, or per student credit hour and similar normalizations.

The PPC met approximately weekly throughout the spring and fall semesters of 2018. To achieve the desired transparency, the Provost issued the agenda to the campus by email prior to each meeting and distributed a meeting summary by email immediately following the meeting—either late that afternoon or the following morning.

The PPC's initial work focused specifically on academic programs with a line in the campus budget. This set included academic degree programs plus non-degree-granting programs, such as freshman engineering, chorus, and fitness courses. To minimize coloring the interpretation of the data by biases of the PPC members, each program was given an ID number by the Director of Institutional Research. Each week the IR Director distributed a data report providing program-specific data for all the previously distributed parameters, plus about four new parameters for each of the anonymized programs. PPC members reviewed these data between meetings and discussed them at the following meeting. Each PPC member was free to decide how to consider and integrate the metrics and their implications for the evaluation or qualitative rankings of the programs. Toward the end of spring semester, PPC discussions considered such topics as "should there be a minimum enrollment for a course to be held?" and "should some program(s) be merged to achieve greater synergies, effectiveness, or economies?" Also, the PPC was provided with the key to identify each academic program with its own data.

As the summaries of the meetings were distributed, some faculty and staff submitted comments and concerns, and the Faculty Senate provided substantive feedback. Industry advisory boards for many of the programs requested and received briefings on PPC's progress and also provided feedback. Other

input came from external sources, including a meeting between Dr. Chris Maples and the PPC in which he discussed his experience with program prioritization at Oregon Technical University; and the University of Montana's budget-driven prioritization process, which had started previously.

As the 2018 spring semester ended, detailed analysis and deliberations regarding academic degree programs were delegated to the three deans overseeing undergraduate colleges. They met regularly over the summer to develop recommendations for presentation to PPC in the fall. Each vice chancellor was assigned to lead the data gathering, presentation, and discussion for non-academic programs/offices/departments under their purview. An approximately biweekly frequency of PPC meetings was scheduled for the summer to focus on non-academic programs. The provost continued to distribute PPC agendas and meeting summaries to faculty and staff throughout the summer.

The chancellor met with the PPC at its first meeting of the fall 2018 semester to request that the committee complete its work by the end of fall semester. He also requested recommendations from the PPC for managing budget issues related to a budget reduction from the state and continuing declines in undergraduate enrollment. The PPC asked for clarity regarding the chancellor's actions on WIRE's recommendations, asking which, if any, of those actions should factor into the PPC's process.

In early October, the three undergraduate deans presented their preliminary plan and guideposts for prioritization of academic programs to the PPC for feedback. Their plan, aligned with WIRE recommendations, was the basis of their analysis and subsequent PPC presentation(s). The deans presented this same plan to the Faculty Senate at the end of the week, and the PPC and chancellor received and considered Senate feedback on this plan. By mid-October, the undergraduate deans released their data to PPC and through the provost to the campus, and the PPC added two students (the ASMT President and an ASMT Senator/Grad Student) to its membership. Also, in October 2018, Chancellor Blackketter announced his planned retirement.

As December approached, the chancellor received PPC input and, in collaboration with the vice chancellors and deans, integrated it into the draft *Montana Technological University Alignment Plan*. At its November 21, 2018 meeting, the PPC developed a process involving iterative releases of report drafts followed by public forums, with input digested by the PPC and chancellor and used to revise the report. By mid-December, 2018, Chancellor Blackketter's draft report had been released; two forums each followed by a PPC meeting were held; and the chancellor's final report was released.

During spring 2019, implementation began for the key recommendations in the *Alignment Plan*, including placing some degree programs in moratorium, and moving some positions and programs into their recommended re-alignment. This process was managed and tracked by the provost using a summary checklist. Not all campus stakeholders - including faculty, staff, students, alumni, employers, and friends - supported all the recommendations.

Thereafter, during spring semester of 2019, the following results of the process were implemented:

- the normal review process was completed by faculty, departments, deans, Curriculum Review Committee, Graduate Council, Faculty Senate, and the Office of the Commissioner of Higher Education;
- identified programs were placed into moratorium;
- affected students were notified;
- "teachout" plans were developed for affected students; and

- steps were taken to reorganize/realign units in accordance with the decisions emerging from program prioritization. The reorganizations/realignments took place over the summer, along with any academic catalog updates.

In a parallel process, during spring and summer 2019, the Budget Committee met frequently to develop the FY2020 budget consistent with the results of the program prioritization. The Budget Committee consists of the Chancellor, Vice Chancellors, Deans, and Budget Director, supported by the Director of Institutional Research. Other important input included revenue expectations from enrollment and from the state’s FY20-21 biennium appropriations, which were finalized by the legislature in April; the Governor in May; and the Regents at their late May meeting.

The fiscal year budget was submitted to the Office of the Montana Commissioner of Higher Education in summer 2019. It was presented to and approved by the Board of Regents at its meeting on September 11-12, 2019. The Budget Committee continues to meet approximately twice per month to optimize the budget allocations in line with actual enrollment-driven revenues and changing needs and conditions.

### Program Planning and Assessment Framework

After reviewing the report from the Seven-Year Peer Evaluation Visit, the Assessment Committee focused on improving the program review process. For example, the Committee determined the one-year review cycle was inadequate: by the time the outcomes evaluations for the previous year were complete and changes proposed, the following year was nearly over with its own assessment process about to begin. The schedule provided no opportunity to implement the changes and determine their impacts in the following cycle. An early decision was to make the cycle bi-annual, giving programs a year to see the impact of changes implemented as a result of the previous assessment. In addition, the Assessment Committee wanted each program to have more ownership of its review process, to embed the use of data more integrally, and to make program-review efforts more useful by allowing the programs to tailor their efforts to their distinct missions and situations.

The first step of implementing the 2-year assessment cycle was to ask each program to prepare a program assessment plan, guided by a set of questions. Assessment frameworks were developed and submitted in spring semester 2018. By early the following semester, each framework was reviewed by at least two members of the Assessment Committee, with feedback provided by early in fall semester 2018 to each program in time for the assessment cycle to begin that academic year.

The templates were developed during fall 2017 by the Assessment Committee, with review and input from several stakeholders. Table 6 presents the program planning template for academic programs.

*Table 6: Template for Academic Program Planning and Assessment Frameworks*

<b>Program Planning Template Questions</b>	<b>Data Specified</b>
What is your program mission statement?	N/A
What are your program objectives?	N/A
What are your program outcomes?	<i>List the performance indicators for each outcome List the metrics for each performance indicator</i>
Describe your program outcome assessment process including timeline.	<i>How the data will be gathered and used</i>
Describe your program outcome evaluation process.	N/A

Table 7 presents the guidance provided to the Assessment Committee members to review the plans. Similar guidelines were provided to help non-academic programs design their program reviews and their data needs, and for the Assessment Committee reviews of these plans. Each set of guidelines included definitions of key terms, such as “objectives” and “outcomes.”

Table 7: Guidelines for Review of Academic Program Assessment Frameworks

Review Questions	Essential Data or Process Features
Is the <b>Mission</b> clear, concise, and appropriate to the program, department, and Montana Tech?	N/A
Are the <b>Program Education Objectives</b> appropriate to the program and its mission?	N/A
Are procedures described for Reviewing the <b>Objectives periodically</b> ?	Does it involve all appropriate stakeholders? Does the review process allow for modifying program objectives and for faculty actions to modify the curriculum?
Are <b>Student Outcomes</b> appropriate and comprehensive, stating what students should know and be able to do at the time of graduation?	Do the outcomes support fulfillment of the program objectives?
Are <b>Performance Indicators</b> appropriate, related to the curriculum, and directly measuring the extent to which each outcome is satisfied?	Are there metric(s) for each performance indicator that <b>ALL</b> students participate in?
Does the procedure for <b>Outcomes Assessment</b> clearly identify, collect, use and prepare metrics that can be used to evaluate achievement of performance indicators and thus student outcomes?	Is the assessment procedure easily repeatable and objective? That is, is the assessment independent of the assessor?
Does the <b>Outcomes Evaluation</b> process involve faculty reviewing the outcomes assessment results, making a determination of the value of findings and actions to be taken to modify the curriculum and ECA?	Is the <b>assessment process</b> and each component of it periodic and documentable? Are any of the objectives, outcomes, performance indicators, and metrics overly burdensome to perform or manage? If so, which one(s)?
What, if any, deficiencies in the program assessment plan need to be remedied?	Closing the loop: continuous improvement.

When this revised approach to program review and assessment was developed in fall 2017, the intention was to develop program-specific frameworks and review them by early fall 2018, and then use them to launch the 2-year assessment cycle in AY 2018-2019. The programs would be split into two groups: one group would complete the major assessment in an odd-numbered academic year, while the other group would do so in an even-numbered academic year. Figure 4 presents an example of the 2-year assessment cycle. Although a report is only produced every other year, the program looks at data every year, and the report would be based on both years of data.

Assessment	July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June
Cycle		x	xxxxxxxx	Fall Term	xxxxxxxx	x	xxxxx	xxxxxxx	Spring Term	xxxxxxxx	x	
Year 1	_____	◇			◇			◇			◇	
Year 2	_____	◇†		*_____	★◇	_____	◇★			# ◇		
Legend	◇ Grad Council Mtg.	† Data Request		* Data Due			# Assess. Feedback		★ Draft & Final PR			

Figure 4: Two-Year Program Review and Assessment Cycle for the Graduate School

The campus focus on program prioritization during spring and fall 2018 and initial implementation of the recommendations during spring 2019 resulted in some realignments and involved all programs and many individuals. As a consequence, the launch of the biannual program review assessment process was deferred for a year, and it was conducted by all programs during fall 2019, with programs assigned respectively in the odd-year or even-year group (2019-20 is an “even-year”).

**Appendix C: Recommendation 4** *The committee recommends that Montana Tech improve its system of evaluation of programs and services, wherever offered and however delivered, to evaluate achievement of program goals or intended outcomes. The institution should ensure that results of core theme assessments and results of assessments of programs and services are based on meaningful indicators of achievement and are used for improvement by informed planning, decision making, and allocation of resources and capacity (Standard 4A2 and 4B1)*

Core Themes:

- Education and Knowledge
- Student Achievement
- Engaged Faculty
- The Montana Tech Community

To improve our system of evaluation, Montana Tech developed and implemented a new program assessment and evaluation process in 2018-19 as described in Appendix B. Academic and non-academic departments received a standard template for developing assessment plans at the department level. The template, rather than being a rigid document that created a single correct way to create assessment plans, was a guide to help standardize language and to ensure that the relevant component parts were included in the planning document. Secondly, the template ensured that departments were engaged in discussions about their programs amongst themselves and with partners external to their department where applicable. Those plans were reviewed by at least two members of the Dean’s Council.

The following terms are used in the process. Table 8 (below) and the discussion that follows was first presented in Part II, Example 2 of this report.

*Table 8: Assessment terms defined*

Term	Definition
Mission	A short statement of a program's purpose. What program is trying to achieve?
Program Educational Objectives - PEOs	What alumni attain a few years after graduation. Fulfills mission.
Student Outcomes - SOs	What students should know and are able to do at the time of graduation.
Performance Indicators - PIs	Specific, measurable statements identifying the performance(s) required to meet the SOs; confirmable through evidence. PIs provide clarity to the SOs.
Assessment Data or metrics	Data collected to conduct assessment.
SOs Assessment	Process that identifies, collects, and prepares assessment metrics to be used in the SOs evaluation. Directly measures attainment of PIs.
SOs Evaluation	Process of reviewing the SOs assessment results and making a determination of the value of findings and actions to be taken.
PEOs Review	Process of reviewing the PEOs to ensure they: 1) remain consistent with the program mission and the constituents’ needs; and 2) graduates are prepared to achieve the PEOs.
Constituents	Students, alumni, industry, faculty

Figure 5 (below) also presented in Part II Example 2 of this report, indicates the center of the process is the “Program” which consists of the curriculum and Extra Curricular Activities (ECAs). The program output is the graduates who eventually become alumni and industry representatives. Continuous improvement is implemented via two feedback paths: one involving the SOs; and one focused on the PEOs. A complete cycle is conducted for both loops on a periodic basis, typically every two to three years. Results are reported every two years.

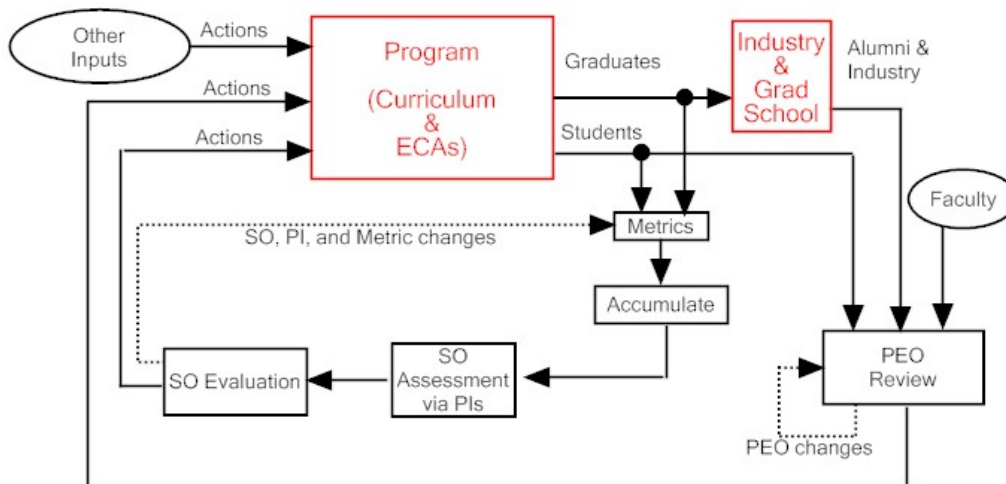


Figure 5: Assessment Process

The inner loop focuses on the SOs. Metrics which measure student and graduate performance with respect to the SOs/PIs are accumulated over a period of time, typically two years. Once enough metrics are accumulated, the SOs are assessed based on the metrics and PIs. The assessment is then evaluated by the program faculty. The outputs of the SOs evaluation are: 1) recommended “actions” to change the program curriculum or ECAs; and/or 2) changes to the SOs, PIs, and/or metrics for future assessments.

The outer loop focuses on the PEOs. Periodically (typically every two years), representatives of the constituents review the PEOs to determine if: 1) they are consistent with the mission and constituent needs, and 2) graduates are prepared to achieve the PEOs. The review is not based on formal assessment and metrics as it is very difficult to measure graduates three to five years past graduation. But, the PEOs review has access to all SOs evaluation results and data as well as anecdotal data from the representative constituents. The outputs of the PEOs review are: 1) recommended “actions” to change the program curriculum or ECAs; and/or 2) changes to the PEOs.

The process also acknowledges other inputs that can implement changes to the program (which are also termed *actions*.) Examples include faculty makeup and opinion, enrollment restrictions, and budget realities.

Starting in 2018-19, each program had to develop and submit an assessment and evaluation plan. Now in 2019-20, each program is required to submit an assessment and evaluation assessment report to describe the status of their process. The appropriate dean reviews each report and provides feedback geared towards continuous improvement for each program.

### Non-Academic Program Reviews

The same template is used by all non-academic programs for reporting, but the objectives and metrics are unit/department specific. A combination of formative, process/implementation, outcome/effectiveness, summative, and impact evaluation is preferred, but not all units have been able to implement each type.



The following non-academic programs complete an annual review: Academic Advising, Academic Center for Excellence (Tutoring Support), Campus Life, Campus Safety, Dining Services, Freshman Engineering Program, General Education, Residence Life, Tech Success (MT1016), and Undergraduate Recruitment.

Program objectives, objective assessment, and objective evaluation are reviewed and adjustments are made based on the outcomes or change in objectives. The Associate Vice Chancellor of Enrollment Management/Dean of Students reviews each of the documents and confers with the author prior to submission. This allows for meaningful conversations and adjustments for the upcoming year.

### **Core Theme Assessments**

To ensure that assessments of core themes integrate activities that occur across the institution, a reporting template was developed and approved by the NWCCU Steering Committee. This template provides a means for gathering information about the Program Review Process by each program/department. It is also used to ensure that disparate programs: include core theme activities in their assessments; provide evidence that they engage in activities that support the core themes; and incorporate plans for improving their programs by including activities that supplement the program's activities.

Programs were asked to provide specific metrics on various activities that are conducted with or on behalf of non-academic programs. Programs were asked specific questions about their efforts in recruitment, advising, enrollment, retention, engagement, and research. Programs were asked to indicate student participation in educational opportunities and co-curricular programs with an educational focus. Departments were also asked to reflect on faculty engagement.

Efforts are underway to integrate indicators of achievement and core themes into the evaluation system. It relies heavily on quantitative indicators, and its initial purpose is to start conversations in departments that will be eventually embedded into departmental activities and plans to meet not only their goals but also contribution to overall institutional advancement. The assessment tool provides opportunities for feedback about what activities the departments find valuable, what they need more information on, and if any related activities that have positive effects.

**Appendix D: Recommendation 5 *The committee recommends that Montana Tech better document and evaluate its cycle of planning practices, resource allocation, application of institutional capacity, and assessment of results to ensure their adequacy, alignment and effectiveness (Standard 5B2).***

Since our 2017 NWCCU campus visit, the campus has implemented a number of initiatives to address Recommendation #5. These initiatives focus on areas such as institutional planning, resource allocation, institutional capacity and assessment. Examples include:

- Workgroup for Institutional Realignment for Excellence (WIRE)/Program Prioritization Process (PP)/Alignment Plan;
- Revised campus-wide budget process; and
- New initiatives in academic planning, Long Range Building Plan, and campus capital infrastructure projects.

**WIRE/PP/Alignment Plan**

WIRE

At their March 10, 2017 meeting, the Montana Board of Regents (BOR) approved a fourth institutional classification for higher education units in the state. The new classification, Special Focus Four-Year Universities, of which Montana Tech is the only unit, was added to the previous three classifications: Two-Year Colleges, Four-Year Regional Universities, and Research Doctoral Universities. Prior to its new classification, Montana Tech was included in the Four-Year Regional Universities classification. This new classification was in part due to the unique mission and high quality of Montana Tech and a recognition of the opportunities a Special Focus designation might afford Montana Tech.

As a response to its new institutional classification by the BOR, Chancellor Blacketter formed WIRE (Workgroup for Institutional Realignment for Excellence) in late March 2017. The charge given to WIRE by Chancellor Blacketter was to “define what it means to Montana Tech to be classified as the only Special Focus Four-Year University in the state.” The 13-member committee, comprised of faculty, staff, and administrators, met with a wide range of campus as well as non-campus entities to discuss the impact of the new classification and to formulate recommendations for Montana Tech. The recommendations of the WIRE group are:

**Recommendation I:** Montana Tech embraces the Special Focus BOR designation as a premiere Science and Engineering institution dedicated to meeting the changing needs of society.

**Recommendation II:** Montana Tech will have a nationally competitive applied research culture.

**Recommendation III:** Our approach to curriculum will focus on integrated problem solving.

**Recommendation IV:** Montana Tech will grow the STEM workforce in Montana and beyond.

PROGRAM PRIORITIZATION (PP)

The 18-member Program Prioritization Committee (PPC) was comprised of representatives from administration, faculty, staff, and students. The committee started its work in January and finished in December when the Alignment Plan was approved by Chancellor Blacketter. The Program Prioritization

process was data-driven and the role of the PPC was to gather both quantitative and qualitative data regarding academic and non-academic units, determine the alignment process, provide input and recommendations regarding prioritization of resources, and ultimately recommend acceptance or non-acceptance of the Alignment Plan.

### ALIGNMENT PLAN

The intent from 2017 was to use the WIRE recommendations as an overarching framework for Program Prioritization and the Alignment Plan. Beginning in early 2018, the Program Prioritization Committee (PPC) gathered metrics and solicited input in order to shape the final Alignment Plan. The Alignment Plan contained recommendations that would more efficiently utilize campus resources such as faculty/staff reductions and placing a number of academic programs into moratorium, for example. The final Montana Technological University Alignment Plan can be located at the following link: (<https://www.mtech.edu/academics/provost/Program-Prioritization-Document-12-14-2018-final-acc.pdf>). The Alignment Plan recommendations have extensively used PPC-generated data and metrics in order to remain objective. Additional input and participation in this process came from campus forums, the Faculty Senate, the campus community, our students, and input from the community and alumni.

### **Revised Campus-Wide Budget Process**

Beginning in January 2018, the campus-wide budget process changed. In prior years, the final campus budget was developed by the Chancellor, Provost, and Vice Chancellor for Administration and Finance after receiving input from Deans, Directors, and Vice Chancellors. The revised budget process involves the following:

- Chancellor,
- Provost,
- Vice Chancellor for Administration and Finance,
- Associate Vice Chancellor/Dean of Students,
- Vice Chancellor for Research/Dean of the Graduate School,
- Vice Chancellor for Development & University Relations/ President of the Montana Tech Foundation
- Dean, School of Mines and Engineering,
- Dean, College of Letters, Sciences, and Professional Studies,
- Dean of Highlands College,
- Director of Budget, and
- Director of Institutional Research (Ex-Officio).

This group met weekly in 2018 to review/revise the FY 2019 budget and to develop the FY 2020 budget. The revisions to the FY 2019 budget allowed the campus to strategically re-allocate resources available from such things as unfilled positions around the campus. The budget group began its deliberation for the FY 2021 budget in January 2020.

### **New Initiatives in Academic Planning**

Another example of how the campus brings together the planning, allocation of resources, capacity determination and assessment is the academic approval process. The first step in the process for new degrees is the BOR's Request to Plan. The BOR requires that campuses demonstrate how a proposed new program supports the campus mission as well as to identify the resources required to implement

the degree, if approved. Once the campus is given permission to proceed, the next step is the internal campus approval process. The process starts at the department level. The department identifies the need for the proposed degree and also the resources required to implement the program. After a review/approval of the proposal by the appropriate dean, the proposal proceeds to the Curriculum Review Committee for approval. If the proposed degree is a masters or doctorate degree, the Graduate Council reviews the paperwork. The final approval at the campus level is the Faculty Senate.

The next step in the process is final consideration by the BOR. The BOR have a number of areas in which the campus must demonstrate planning, resource allocation and analysis/assessment of institutional capacity. For example, in April of 2019 the BOR approved Tech's new Masters of Engineering (MEng) Degree. The paperwork for this request required the campus to identify the need for the program, how the program will be assessed as well as detailed physical, personnel and financial resources required to implement and sustain the MEng program. The paperwork required for a new degree request (Level II paperwork) can be found at <https://mus.edu/che/arsa/Forms/AcademicForms.asp>.

The plan for the MEng degree program is to make it available to students via distance learning format(s). The campus reviewed its resources currently available to support the program and decided to increase the distance learning fee to provide additional dollars to hire an Instructional Designer to support the program and faculty operating in the distance learning arena. An Instructional Designer was hired in February 2020.

In addition to the initiatives previously identified, the new campus leadership team is in the early stages of developing new master and strategic plans that will guide Montana Technological University into the future. The Long Range Building Plan (LRBP) and other campus capital infrastructure projects will be developed through these plans. The four areas of focus for Montana Tech's strategic plan are the four NWCCU core themes. Employing the core themes as the guideposts in our strategic plan will assist the campus in demonstrating mission fulfillment.

## Appendix E: Montana Tech Commonly Requested Resource Websites

- Montana Tech Website
  - <https://www.mtech.edu/index.html>
- Montana University System
  - <https://mus.edu/che/default.asp>
- Montana Tech Administration
  - <https://mtech.edu/about/administration.html>
- Montana Tech Strategic Plan
  - <https://www.mtech.edu/about/strategic-plan/electronic-versions.html>
- Montana Tech Accreditation Information
  - <https://www.mtech.edu/about/accreditation/>
- Montana Tech Provost (includes Departmental Standard, Program Prioritization, Collective Bargaining Agreements, and Other Relevant Resources)
  - <https://www.mtech.edu/academics/provost/>
- Montana Tech Catalogs
  - <https://mtech.edu/enrollment/catalog-calendars-schedules/Catalogs.html>
- Montana Tech Program Reviews
  - <https://www.mtech.edu/assessment/program-review.html>
- Montana Tech Budget and Human Services
  - <https://www.mtech.edu/administrative-services/budgets/>
- Financial Audit University of Montana For the Two Fiscal Years Ended June 30, 2019
  - <https://leg.mt.gov/content/Publications/Audit/Report/19-10A.pdf>
- Financial Audit University of Montana For the Two Fiscal Years Ended June 30, 2018
  - <https://leg.mt.gov/content/Publications/Audit/Report/17-10B.pdf>
- Financial Audit University of Montana For the Two Fiscal Years Ended June 30, 2017
  - <https://leg.mt.gov/content/Publications/Audit/Report/17-10A.pdf>
- Montana Tech Research Office
  - <https://mtech.edu/research/>
- Montana Tech Foundation
  - <http://foundation.mtech.edu/>
- Montana Tech Athletics
  - <https://godiggers.com/>
- Montana Tech Dean of Students
  - <https://mtech.edu/student-services/dean-of-students/>

## Appendix F: Site Visit Workroom Documents

- Accreditation Board for Engineering and Technology (ABET)
  - Applied Science Accreditation Commission (ASAC)
    - 2016-2017 Report
    - July 1, 2018 Interim Report
  - Computing Accreditation Commission (CAC) 2016-2017 Report
  - Engineering Accreditation Commission (EAC) 2016-2017 Report
- Commission on Collegiate Nursing Education (CCNE) Report
  - CCNE Accreditation Letter November 1, 2018
  - CCNE Evaluation Team Report 2018
  - Montana Tech Response CCNE Evaluation Team Report 2018
- International Accreditation Council for Business Education (IACBE) Report
- Financial Audit University of Montana For the Two Fiscal Years Ended June 30, 2019
  - <https://leg.mt.gov/content/Publications/Audit/Report/19-10A.pdf>
- Financial Audit University of Montana For the Two Fiscal Years Ended June 30, 2018
  - <https://leg.mt.gov/content/Publications/Audit/Report/17-10B.pdf>
- Financial Audit University of Montana For the Two Fiscal Years Ended June 30, 2017
  - <https://leg.mt.gov/content/Publications/Audit/Report/17-10A.pdf>
- Montana Tech Program Reviews
  - <https://www.mtech.edu/assessment/program-review.html>
- Workgroup for Institutional Realignment for Excellence (WIRE) Final Report
- Montana Technological University Alignment Plan
  - [November 30, 2018 \(Version 1.0 Initial Recommendations\)](#)
  - [December 6, 2018 \(Version 2.0 Initial Recommendations\)](#)
  - [December 13, 2018 \(Version 3.0 Recommendations\)](#)
- Ruffalo Noel Levitz
  - December 4, 2019 Report
  - February 20, 2020 Report
  - March 4, 2020 Report
- ADV Market Research & Consulting
  - Internal Audience Report January 2020
  - Prospective Student Report January 2020