

Montana Technological University Alignment Plan

December 13, 2018

Version 3.0 Recommendations

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Alignment Plan Introduction

This document presents the results of Montana Technological University's extensive program prioritization process and subsequent alignment plan. Review and assessment was conducted across the entire University in all units. The process for developing the plan began before May of 2017 when the MUS Regents approved a new classification called Special Focus within the Montana University System. Montana Tech is the only MUS institution in this classification. This Special Focus classification recognizes the importance and unique Mission of Montana Tech. Preparation for this alignment plan began with the Workgroup for Institutional Realignment for Excellence (WIRE) discussions that resulted in high-level and specific recommendations on what the Special Focus designation means. In summary, Wire concluded:

- Affirmation of our mission as a premier Science and Engineering institution
- Continue building a culture of applied research
- A commitment to an integrated curriculum approach focused on problem solving
- A commitment to workforce development

The intent from 2017 until today was to use the WIRE recommendations as an overarching framework for program prioritization and alignment. Since early 2018, the Program Prioritization Committee (PPC) has gathered metrics and solicited input in order to shape the now final Version 3. The Alignment Plan recommendations have extensively used PPC generated data and metrics in order to remain objective. Additional input and participation has come from campus forums, the Faculty Senate, the campus community, our students, and input from the community and alumni.

Some have looked at this process as being driven solely by a financial crisis. This is not the case. While reductions are needed, a major driver for the recommendations are to meet both Mission and resource effectiveness. In this context, Montana Tech has the responsibility to continue to look internally to ensure we are providing the highest quality education for our students, the best set of programs for our students, and to accept responsibility to the Montana taxpayers to use their hard-earned tax dollars to maximum effectiveness. I want to recognize the strong support from Governor Bullock, the SW Montana Legislative delegation, and the Commissioner for their unwavering and concrete support for higher education and Montana Tech.

Montana Tech's financials are solid with a balanced budget in Fiscal Year 2018 as well as in Fiscal year 2019. Further, Montana Tech continues to hold significant reserves in a number of areas including our contingency fund (at the maximum the Regents allow), in our Indirect Costs associated with Research, and in our Auxiliary functions (dorms, dining services, athletics, to name a few). Moving forward, we will be developing strategies to more effectively use these reserves while maintaining a fiscally prudent reserve balance.

In Version 3.0 of the Alignment Plan, a number of "one-pagers" have been edited for consistency and clarification. One significant recommendation is that the Highlands College Assistant Dean is recommended to be a shared position with 50% paid from State funds in support of Highlands and 50% paid from non-State funds focusing on grant writing and other revenue generating activities. This effectively reduces administration by 0.5 FTE.

Going forward, the components of program prioritization will become a continuous process where program effectiveness will be periodically (yearly) measured and assessed. The outcomes of this assessment, using quantitative metrics, along with the strategic plans of the institution, will be the basis for hiring new faculty, moving faculty lines between programs, establishment of new programs, and placing programs on improvement plans. Metrics for all programs will minimally include program enrollment, student credit hours taught, retention, and research productivity along with Mission alignment, societal impact, and graduate employment opportunities.

While presented as a final document, I consider the plan to be a fluid document that while providing a base, can also evolve and morph as further improvements are found during implementation. I believe the implementation of this Alignment Plan will position Montana Tech to not only enable us to more effectively allocate our resources, but will also enhance student opportunities, enhance the student experience, facilitate collaboration across campus, and enable the campus to make future investments into priorities and high growth areas. I want to thank the WIRE members, the Program Prioritization Committee, faculty, staff, students, the community, and all who provided input into this process.

Donald M. Blacketter, Chancellor

Wire Executive Summary

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 due in part 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 entities to discuss the impact of the new classification. Since April of 2017, WIRE has met with numerous groups both on and off campus to create a set of recommendations for Chancellor Blacketter. This report contains the recommendations of the group.

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

Montana Tech recognizes the need for an informed citizenry prepared to understand issues related to energy, natural resources, environment, water, data, and health. We recognize that the highly technical nature of these problems presents an obstacle to creating that informed citizenry. We recognize that Montana Tech’s mission, legacy, culture, and values promote proven solutions to these challenges.

Montana Tech embraces the opportunity to pursue its special focus designation by becoming the science and engineering institution of choice to solve these problems now and in the future. Montana Tech will have an ethos of educating the whole person through intensive intellectual dialogue between students and faculty across diverse spheres of inquiry.

Fulfilling our vision will require several institutional changes including:

- An institutional name that reflects our values, vision, and aspired national stature. The “of the University of Montana” invokes a regional scope that is not reflective of our role as a Special Focus Institution. WIRE strongly supports that our name change to match our brand of “Montana Tech”.
- The Chancellor should continue to report directly to the Commissioner level. This reporting line gives Montana Tech the ability to pursue collaborations with all other institutions in the MUS and beyond.
- Entrance standards should measure the potential of students to succeed at Montana Tech.
- A physical and organizational restructuring that will support instructional collaboration, increased research output, and a strong general education curriculum

- Appropriate tuition/fee rates to enable Tech to offer nationally competitive programs
- Mission driven MS and PhD programs in focused areas of Science and Engineering
- Curricular modification/development to facilitate effective multi-disciplinary and experiential learning for all majors
- Appropriate faculty pay scales, benefits, tenure and promotion standards, workload, and incentives to attract and retain scholars

Some of these actions have obviously already been achieved fully or in part, with the rest still needing to be addressed or completed.

Program Prioritization Committee: Overview of Process

| | |
|------------|---|
| 1/4/2018 | Campus-wide meeting to introduce the Program Prioritization concept to the campus. |
| 1/24/2018 | Program Prioritization Committee's (PPC) first meeting. Chancellor Blacketter provides direction/charge. |
| 1/31/2018 | PPC began collecting metrics/data: regularly reported data sets such as IPEDS, Delaware study, etc. Discussed metrics at subsequent meetings. |
| 2/28/2018 | Committee members "rank" academic programs based on data sets. The identity of the academic programs was not revealed to the committee members. |
| 3/28/2018 | The PPC "ranking process" resulted in multi-colored ranking matrix that was presented to campus. Academic programs were identified. |
| 4/25/2018 | PPC creates academic subcommittee to review academic programs. |
| 5/2/2018 | PPC creates non-academic subcommittee. Chancellor charges academic subcommittee to reduce student/faculty ratio from 14:1 (current level) to 16:1. |
| 8/29/2018 | Chancellor met with PPC on August 29. Charged committee with cutting \$500,000 - \$1,000,000 |
| 10/5/2018 | Deans present Guideposts and Metrics to Faculty Senate. |
| 10/19/2018 | Deans release data sets that will drive their review of academic programs. |
| 10/24/2018 | PPC considers feedback from faculty on the data released from the deans. PPC develops proposed process/timeline for Oct-Dec time period. December 14 th identified as "due date" for final report. |
| 11/21/2018 | PPC finalizes timeline for report. |
| 11/30/2018 | Draft initial report (Version 1.0) is released to the campus. |
| 12/6/18 | Draft initial report (Version 2.0) is released to the campus. |
| 12/13/18 | Draft initial report (Version 3.0) is released to the campus. |

The Academic-side of the campus was the focus of the PPC from January through May. The Non-Academic side of the campus was the focus from May through August and Academics was again the focus from August to present. The PPC participated in presentations by the Foundation, WIRE, Institutional Research, Registrar, Deans, and Vice Chancellors.

The PPC committee felt that the prioritization process should be transparent and data/metric driven. The agendas and overviews of the meetings were sent to the campus for each meeting. The Academic subcommittee presented their guideposts and data to the PPC and Faculty Senate.

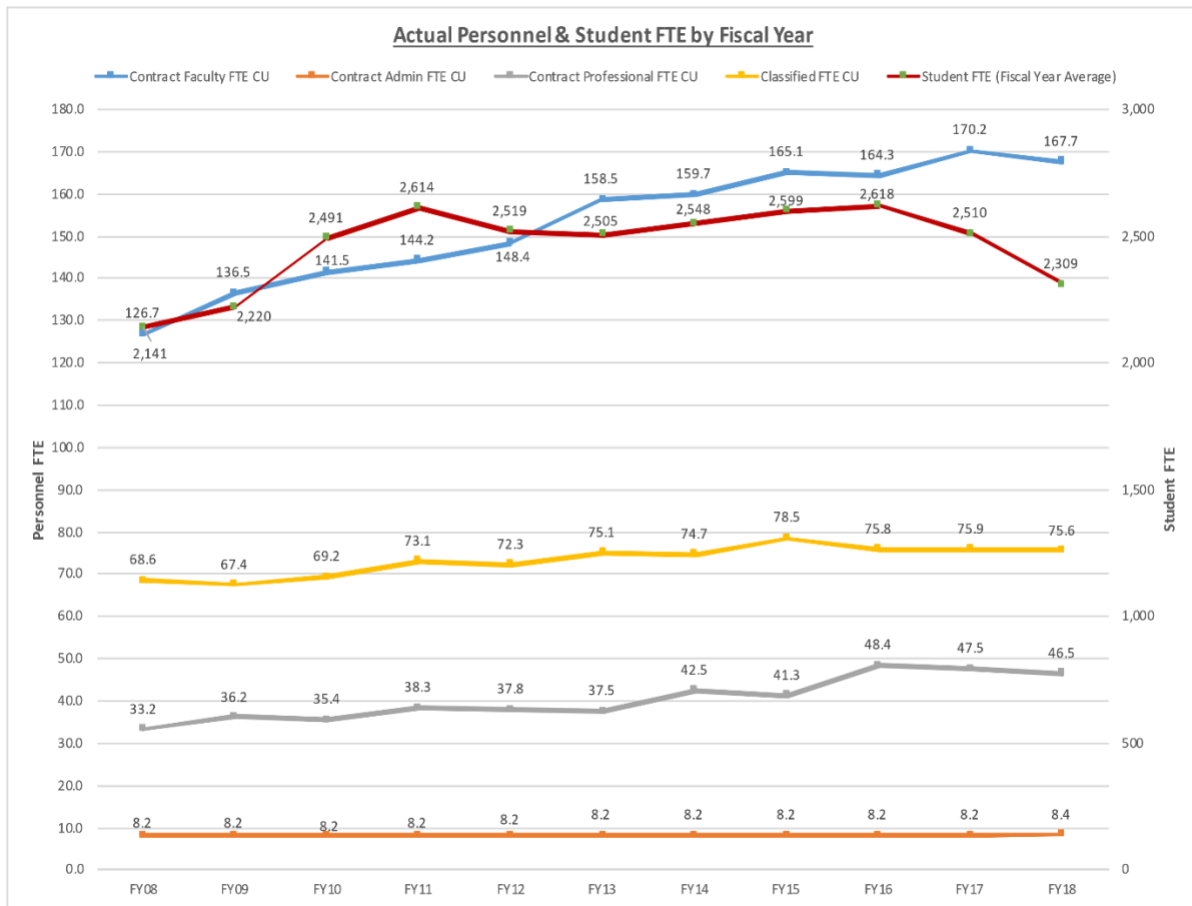
PPC Members:

| | | | |
|---------------------|---------------|-----------------|------------------|
| Doug Abbott (Chair) | Steve Gammon | Chance Maes | Isaiah Robertson |
| Chris Danielson | Dave Gurchiek | Joe McClafferty | Marv Speece |
| Leslie Dickerson | Bev Hartline | Peggy McCoy | Dan Trudnowski |
| Charie Faught | Melissa Kump | Vicki Petritz | Carrie Vath |
| | | | Brant Wright |

Melissa Kump is an Ex-Officio (non-voting) member while Maes and Robertson were selected by ASMT.

The graph below was presented to the campus at the January 4, 2018 campus forum. A review of the graph provides insight into a number of areas:

- Montana Tech's student/faculty ratio has decreased from 16.9 in FY 08 to 13.8 in FY 18.
- Enrollment has grown 7.8% from FY 08 to FY 18.
- The number of FTE faculty has increased 32.4% from FY 08 (126.7 FTE) to FY 18 (167.7 FTE).
- The number of classified FTE employees has increased 10.2% from FY 08 (68.6 FTE) to FY 18 (75.6 FTE).



- The number of contract professionals has increased 40.1% from FY 08 (33.2 FTE) to FY 18 (46.5). A portion of this increase is attributed to a reclassification effort that the campus underwent wherein classified employees were converted to contract professionals.
- The number of contract administrators has grown 2.4% from FY 08 (8.2 FTE) to FY 18 (8.4 FTE).

Guideposts for Program Prioritization

The foundation for the guideposts are the WIRE recommendations.

Guidepost 1

- Based on WIRE Recommendation 1
- Science and Engineering (S&E) programs are given special consideration
 - 4-year and graduate S&E programs will be given a higher priority when considering program elimination versus re-organization/support/enhancement.
 - CIP-code S&E specific programs include
 - All ABET accredited engineering programs (10 total)
 - MPEM
 - Computer Science
 - Chemistry
 - Biology
 - Math, Statistics, and Data Science
 - Network Technology

Guidepost 2

- Based on WIRE Recommendation 1 and 4
- 2-year career technical programs are given special consideration
 - Priority will be placed on 2-year programs that have the potential:
 - to matriculate to S&E 4-year programs (BS, BAS),
 - to draw students from out-of-state
 - OR
 - that prepare students for careers in high-demand middle skill STEM occupations
 - Middle Skill Occupations: occupations that require some post-secondary education but less than a four-year degree
 - STEM defined by O*NET

Guidepost 3

- Based on WIRE Recommendations 1 and 2
- S&E programs with historically high research productivity and potential for future strong research are given higher priority.

Guidepost 4

- Based on WIRE Recommendations 1 and 4
- Strategic alignment of 2-year and 4-year programs
 - Initiate process to integrate and rebrand Highlands College
 - Align related programs between North and South Campuses to create seamless transitions for students, faculty and administrators.

Program-by-Program Academic Recommendations

Civil Engineering (CE) Department

Degrees offered

- BS Civil Engineering (to be accredited)
- BS General Engineering, Civil option (being transitioned out)
- Participates in the MS General Engineering

FY19 FTE = 5

Guideposts and Metrics

- **Guidepost 1:** Civil Engineering is designated as an S&E program. It represents a new area for Tech and merits investment as it complements our heritage natural resource area.
- **Guidepost 3:** CE does participate in research and has an active graduate degree.
- **Enrollment and Teaching:** CE has high enrollment with more than 100 total FTE and good enrollment growth over the past 3 years. The potential enrollment is very high. CE/ME has moderately high teaching loads at greater than 450 SCH/FTE faculty. They teach a mix of service and program specific courses.
- **Expenditures:** CE/ME has very low expenditures compared to national metrics. It is difficult to separate CE from ME.
- **Research:** CE/ME ranks low in C&G revenue, moderate in C&G salary, and moderate in graduate research degrees awarded. It is difficult to separate CE from ME.

Overall Observations

CE has the potential to be a high-enrollment flywheel program for Tech. Achieving ABET accreditation and faculty stabilization is critical. With the maturing of the faculty, research is expected to improve.

Recommendation

- No changes recommended.

Change from FY19

None. Complete the current search being conducted.

Electrical Engineering (EE) Department

Degrees offered

- BS Electrical Engineering
- MS Electrical Engineering

FY19 FTE = 4.11

Guideposts and Metrics

- **Guidepost 1:** Electrical Engineering is designated as an S&E program. Their focus area of power systems and much of their research focuses in the integration of renewable energy into the grid. This is highly complementary to the heritage engineering programs at Tech.
- **Guidepost 3:** EE participate in research and has an active graduate degree.
- **Enrollment and Teaching:** EE has moderately low enrollment with approximately 85 total FTE. The potential enrollment is high. EE has moderately low teaching loads being between 300 and 450 SCH/FTE faculty (when they had 5 faculty). They teach a mix of service and program specific courses.
- **Expenditures:** EE expenditures are low and very close to national metrics.
- **Research:** EE ranks high in C&G revenue, high in C&G salary, and moderate in graduate research degrees awarded.

Overall Observations

EE is a focused department which has resulted in very strong research and industry relationships. The only negative component is the moderately low enrollment. Ideally, EE should have an enrollment near 100 to 120 FTE; they are near 85. A serious issue that impacts enrollment and recruiting is the fact that EE does not show well as it is housed in the attic of Main Hall. Also, EE is down to 4 faculty with an open position which is at a critically low level.

Recommendation

- Move EE and Mechanical Engineering to ELC 3rd floor to better utilize the NRRC and to improve how they “show”. The EE and ME departments will soon have nearly all their labs in the NRRC. Both have potential to grow enrollment as indicated by national and state trends. Additionally, these two programs have strong synergistic connections.

The NRRC is a showcase building for Tech and primarily houses ME and EE labs. But, there is a lack of traffic and “buzz” within the NRRC. The NRRC houses high-volume labs but it is nearly empty when labs are not in session. This is because most the students using the NRRC are ME and EE majors. They choose to congregate and study near their professors’ offices which are in the S&E and Main Hall. None of the programs currently housed in the ELC (which is connected to the NRRC) enter the NRRC because their respective programs do not utilize any of the NRRC lab space.

- Fill the vacancy from Trudnowski becoming Dean. EE faculty may need to teach some physics courses.

Change from FY19

An addition of 1 faculty line.

Environmental Engineering (EnvE) Department

Degrees offered

- BS Environmental Engineering
- MS Environmental Engineering
- Masters in Project Engineering Management (MPEM)

FY19 FTE = 6.11

Guideposts and Metrics

- **Guidepost 1:** Environmental Engineering is designated as an S&E program. It is one of the oldest Environmental Engineering programs in the US.
- **Guidepost 3:** EnvE participates in research and has an active graduate research degree.
Enrollment and Teaching: EnvE has moderately low enrollment with approximately 80 total FTE. EnvE has low teaching loads being below 300 SCH/FTE faculty (the lowest of all programs). They primarily teach program specific courses.
- **Expenditures:** EnvE expenditures are very high as they are over 20% of the national metrics.
- **Research:** EnvE ranks low in C&G revenue, low in C&G salary, and high in graduate research degrees awarded.

Overall Observations

EnvE's low teaching loads are directly coupled with the 6.11 FTE faculty lines (4 of them new faculty); this creates a problem. Some of the new faculty have recently demonstrated potential for building funded research programs. The MPEM is very low enrollment and seems to be an extra weight on the program.

Recommendation

- Reduce the number of faculty lines in the department to 5.11 FTE.
- Participate in service load for the SME.
- Develop marketing and recruitment strategies to distinguish the department from Environmental Sciences and Studies programs throughout the U.S.
- Remove the MPEM from the department. The MPEM should be re-scoped as a Masters in Project Management and delivered via the Graduate School.

Change from FY19

A reduction of 1 faculty line.

Geophysical Engineering (GeopE) Department

Degrees offered:

- BS Geophysical Engineering
- Participates in the MS Geosciences.

FY19 FTE = 6. This includes 2 physic instructors.

Guideposts and Metrics

- **Guidepost 1:** Geophysical Engineering is designated as an S&E program. It is highly specialized and core to our natural resource heritage.
- **Guidepost 3:** GeopE is active in research and has an active graduate research degree.
Enrollment and Teaching: GeopE total enrollment is low with the BS enrollment very low (12 FTEs in Fall 2018). The department delivers a large service component in the physics courses and therefore their teaching load is moderately high to high. The teaching load for the GeopE specific courses is very low. The service component has decreased significantly due to a drop in the PET enrollment.
- **Expenditures:** GeopE expenditures are very low due to the high service teaching.
- **Research:** GeopE ranks moderate to low in C&G revenue, moderate in C&G salary, and moderate in graduate research degrees awarded.

Overall Observations

GeopE delivers only one of two BS Geophysical Engineering programs in the nation; all other geophysics programs in the US are delivered as non-engineering programs. The GeopE BS is a specialized degree and it is very difficult to recruit students into the BS program. This low enrollment is a heavy weight on the department. The heavy service component is also a heavy weight as the service load is near 4+ FTE per year. The department has the goal of expanding its research but lacks time with the heavy service burden.

Recommendation

- Eliminate the BS in Geophysical Engineering degree. Replace it with a 120-credit BS in Geophysics degree. A non-engineering degree is more consistent with the market and requires less curriculum and FTE to maintain. A primary objective of this program is to place students into graduate programs.
- Convert the “MS Geosciences/Geophysical Engineering Option” to “MS Geosciences/Geophysical Option” or a standalone MS Geophysics degree. Consistent with making the BS a non-engineering program, the MS program becomes non-engineering. See GeolE for possibly splitting or re-packaging the MS Geosciences degree.
- Eliminate the minor in Physics.
- Reduce and re-organize the Physics curriculum per:
 - Reduce the number of PHSX 234, 235, and 237 sections. The goal is to have 70 students per section.
 - Move PHSX 423 to Electrical Engineering.

- Reduce the number of faculty dedicated to the Geophysics programs to three faculty. Pursue an endowed chair from industry. The two faculty dedicated to the physics instruction remain.
- Consider merging the GeopE department with the GeolE department. The GeolE/GeopE department would be the heart of our geosciences expertise at Tech. Consider a new name for the department reflective of all programs in the dept. The advantage of the proposed merger is the synergistic opportunities of having one large Geo department – e.g., faculty collaborations, strategic development, improved curriculum for all geo programs, and opportunities for endowing. The endowing opportunity is especially acute
- Evaluate where the two Physics instructors are housed. Also, faculty from other engineering programs must contribute to teaching physics classes. Geophysics faculty will not be expected to solely support the physics service curriculum (e.g., no more than one FTE from geophysics faculty will teach physics classes). The goal is to free the Geophysics faculty to deliver the geophysics curriculum and to expand Tech’s geo-related research.

Change from FY19

A reduction of 1 faculty line.

Geological Engineering (GeolE) Department

Degrees offered:

- BS Geological Engineering
- Participates in the MS Geosciences

FY19 FTE = 5

Guideposts and Metrics

- **Guidepost 1:** Geological Engineering is designated as an S&E program. It is core to our natural resource heritage.
- **Guidepost 3:** GeolE is active in research and has an active graduate research degree.
- **Enrollment and Teaching:** GeolE total enrollment is moderately low but the graduate enrollment is large with nearly a quarter of the enrollment being graduate students. The teaching load is moderately low being just below the 450 SCH/FTE faculty range. They do carry service, especially GEOL 101 which has high enrollments.
- **Expenditures:** GeolE expenditures are very low compared to national metrics.
- **Research:** GeolE ranks high in C&G revenue, moderate in C&G salary, and high in graduate research degrees awarded (top program).

Overall Observations

GeolE does an excellent job in the research area. One of the best research groups at Tech. Teaching levels are significantly decreasing primarily due to drop in service demand from the drop in PetE enrollment.

Recommendation

- Consider merging GeopE and GeolE into one department. See recommendations for GeopE.
- Consider spitting the MS in Geosciences into multiple degrees, including an MS in Geological Engineering.
- Replace the opening that will be created by a retirement in the department.

Change from FY19

None.

Mechanical Engineering (ME) Department

Degrees offered

- BS Mechanical Engineering (to be accredited)
- BS General Engineering, Mechanical option (being transitioned out)
- Participates in the MS General Engineering
- Participates in PhD in Material Science

FY19 FTE = 7.11

Guideposts and Metrics

- **Guidepost 1:** Mechanical Engineering is designated as an S&E program. It represents a new area for Tech and merits investment as it complements our heritage natural resource area.
- **Guidepost 3:** Mechanical Engineering does participate in research and has active graduate degrees.
- **Enrollment and Teaching:** ME has very high enrollment with more than 200 total FTE. The potential enrollment is even higher (300+ FTE). CE/ME has moderately high teaching loads at greater than 450 SCH/FTE faculty. They teach a mix of service and program specific courses.
- **Expenditures:** CE/ME has very low expenditures compared to national metrics. It is difficult to separate CE from ME.
- **Research:** CE/ME ranks low in C&G revenue, moderate in C&G salary, and moderate in graduate research degrees awarded. It is difficult to separate CE from ME

Overall Observations

ME is currently a very high enrollment program with 229 FTE and has the potential to be over 300. And, it is still a very new program that is not even yet accredited. Achieving ABET accreditation is absolutely critical. With the maturing of the faculty, research will grow. The investments in the nano and material science areas has resulted in newer faculty with considerable research potential. ME C&G revenue is low compared to the C&G salaries because nearly all their research has been thru the ARL grant. They need to establish their own competitive research funding.

The ME department does not show good and this will impact potential recruitment and enrollment growth. We need to leverage the new NRRC to facilitate recruitment into ME.

Recommendation

- Move EE and ME to ELC 3rd floor to better utilize the NRRC and to improve how they “show”. Both these programs will soon have nearly all their labs in the NRRC. Both have potential to grow enrollment as indicated by national and state trends. Also, these two programs have strong synergistic connections to each other and MME.

The NRRC is a show-case building for Tech and primarily houses ME and EE labs. But, there is a lack of traffic and “buzz” within the NRRC. The NRRC houses high-volume labs but it is nearly empty when labs are not in session. This is because currently most the students using the NRRC are ME and EE students. They choose to congregate and study near their professors’ offices which are in the S&E and Main Hall. None of the programs currently housed in the ELC (which is connected to the NRRC) utilize the NRRC because their respective programs do not utilize any of the lab space in NRRC.

- Move the material science curriculum into ME. Also move one faculty line from MME to ME. The MME department is too small to carry multiple focus areas and has consciously chosen to prioritize metallurgy over materials (see MME review). The ME faculty are highly engaged in the material science area. And, the ME department is large enough to foster multiple focus areas (mechanical and materials engineering).

Change from FY19

One addition via moving a line from MME to ME.

Metallurgy and Materials Engineering (MME) Department Degrees offered

- BS Metallurgical and Materials Engineering
- MS Metallurgical and Minerals Processing Engineering
- Participates in PhD in Material Science.

FY19 FTE = 5.5

Guideposts and Metrics

- **Guidepost 1:** MME is designated as an S&E program. It is an heritage program.
- **Guidepost 3:** MME participates in research and has active graduate degrees.
- **Enrollment and Teaching:** MME has moderately low enrollment with a 3-year decline. MME has low teaching loads being just below or near 300 SCH/FET faculty. They teach a mix of service and program specific courses.
- **Expenditures:** MME has low expenditures being near the national average for expenditures.
- **Research:** MEE ranks moderate in C&G revenue, high in C&G salary, and high in graduate research degrees awarded.

Overall observations

MME struggles in honoring the breadth of their degree primarily because of low BS enrollment. They have two focus areas: extractive metallurgy/mineral processing versus materials. The department significantly struggles with balancing these two focus areas among the curriculum and faculty expertise. In large part, this struggle stems from their low enrollment and low faculty numbers. They do not have the faculty numbers or enrollment to justify robust offerings in both focus areas. They have consciously chosen to prioritize the metallurgy/minerals area over materials area. Also, they are very productive in research.

Recommendation

- Have the department focus on metallurgy/minerals only. Move the material science curriculum and one faculty line out of MME and into Mechanical Engineering. Several of the Mechanical Engineering faculty are highly engaged in the material science area, and the ME department is large enough to foster multiple focus areas (mechanical and materials engineering).
- Use adjuncts and graduate students to cover classes until Huang fully retires (he is 1/3 at this time). When he does fully retire, replace this position.

Change from FY19

Move one faculty line to Mechanical Engineering to follow an appropriate level of materials curriculum.

Mining Engineering (MinE) Department

Degrees offered:

- BS Mining Engineering
- MS Mining Engineering.

FY19 FTE = 5.

Guideposts and Metrics

- **Guidepost 1:** Mining Engineering is designated as an S&E program. It is a strong heritage program.
- **Guidepost 3:** MinE participate in research and has an active graduate degree.
- **Enrollment and Teaching:** MinE has moderately low enrollment with approximately 75 total FTE. MinE has moderately low teaching loads being between 300 and 450 SCH/FTE faculty. They teach a mix of service and program specific courses; a large part of their service load is Engineering Econ.
- **Expenditures:** MinE expenditures are very low compared to national metrics.
- **Research:** MinE ranks moderate in C&G revenue, moderate in C&G salary, and high in graduate research degrees awarded.

Overall Observations

MinE is a strong department with a good focus in delivering an applied BS program. They have worked hard to establish a unique niche with the underground mine. They have strong potential to establish a professional graduate program via the M.Eng.

Recommendation

- No changes recommended.

Change from FY19

None.

Petroleum Engineering (PetE) Department

Degrees offered:

- BS Petroleum Engineering
- MS Petroleum Engineering

FY19 FTE = 9.22

Guideposts and Metrics

- **Guidepost 1:** PetE Engineering is designated as an S&E program.
- **Guidepost 3:** PetE participate in research and has an active graduate degree.
- **Enrollment and Teaching:** PetE Fall 2018 enrollment is 192 FTE; down from 510 FTE in 2015/16. The current enrollment is relatively high; but, the decrease is very significant. PetE teaches very little service courses. Its program SCH taught follows the enrollment trend – high in 2015/16 with a significant decrease going forward.
- **Expenditures:** In FY17, PetE expenditures were below national averages. But, with the drop in enrollment, they are likely close to the national average today.
- **Research:** PetE ranks moderate in C&G revenue, moderate in C&G salary, and moderate in graduate research degrees awarded.

Overall Observations

The significant enrollment swing is not unexpected as it is tied, for the most part, to the price of oil. In 3 years, the department has swung from over enrolled to under enrolled. The natural reaction is to reduce faculty lines. But, history has shown it is very difficult to hire qualified PetE faculty. Also, it is likely the enrollment will cycle back. The department likely runs best at a student-to-faculty ratio near 30/1, and fewer than 300 students. We must be cautious.

Recommendation

- Reduce the faculty by one position.
- In addition, have the PetE faculty teach the equivalent of one FTE outside of PetE. Options include math, physics, and mechanical engineering.

Change from FY19

A reduction of 1 faculty line.

Safety Health & Industrial Hygiene (SHIH) Department

Degrees offered:

- BS Occupational Safety and Health
- BS Applied Health and Safety Sciences
- MS Industrial Hygiene
- MS Industrial Hygiene via Distance Learning

FY19 FTE = 7.33 (including Applied Health & Safety)

Guideposts and Metrics

- **Guidepost 1:** SHIH is not designated as an S&E program. But, the department faculty have strongly argued that they are not properly CIP-code classified by the Tech administration. They argue that they should be classified under the S&E CIP 15.0701 (Occupational Safety and Health) instead of the non-S&E CIP 51.2206 (Occupational Health and Industrial Hygiene). Dean Trudnowski agrees with them for two reasons: 1) the strong focus of the programs in safety sciences; and 2) the fact that 3 of the 4 programs are ABET accredited.
- **Guidepost 3:** SHIH participate in research and has an active graduate degree (MS on campus). Their online MS program is a non-research program and has very good enrollment.
- **Enrollment and Teaching:** SHIH has high enrollment with approximately 160 total FTE with slight decline. They have moderately high teaching loads being just above 450 SCH/FTE faculty. SHIH primarily teaches program specific courses
- **Expenditures:** SHIH expenditures are very low compared to national metrics.
- **Research:** SHIH ranks moderate in C&G revenue, low in C&G salary, and high in graduate research degrees awarded.

Overall Observations

The SHIH department is very productive and does an excellent job in three of the four programs they deliver. The AHSS program is the one exception. This program is not accredited and has little tie to the mission of the SME and its curriculum might match more with a pre-health program. Only one professor is dedicated to this program which is also a major concern. The AHSS has low enrollment; but, its enrollment is growing.

Recommendation

- Remove the AHSS program from the SHIH department and house it in the Biology department.
- Move the faculty member who teaches and advises the AHSS program into the Biology department.

Change from FY19

A reduction of 1 faculty line tied to the AHSS program. (Move to Biology).

Biological Sciences Department

Degrees Offered/Options

- BAS Biology
- BS Biological Sciences Organismal Track
- BS Biological Sciences Cellular/Molecular Track

FY19 FTE = 7.42

Guideposts and Metrics

- **Guidepost 1:** Designated as an S&E program.
- **Guidepost 3:** Biology does not have a stand-alone graduate degree. The department does engage in graduate and undergraduate research. Faculty serve as the research director for students completing graduate degrees.
- **Enrollment and Teaching:** Review of the metrics indicates that Biology is a consistent, strong performer in the majority of categories in the upper 50% and never lower than 40%. Biology has demonstrated one of the strongest enrollment growths during the AY 15/16-AY 17/18 period (upper 15%). During the fall of 2018, the program added an additional 15 students.
- **Expenditures:** Biology has low relative instructional costs, being 5% above the Delaware peer group when comparing Expenditures Above National (SCH basis).
- **Research:** Engaged in research at an appropriate level given program resources and staffing. Very successful in obtaining external support of work for a program with an undergraduate focus.

Overall Observations

Biological Sciences is a strong department that has modest enrollment growth. This enrollment growth has occurred during a time of overall enrollment decline at Montana Tech. The department effectively and efficiently teach a large number of students in service courses and is an important contributor to the success of the Nursing program. The success of program faculty in obtaining external funding is notable.

Recommendation

- The program is encouraged to maximize the potential of the Restoration Certificate.
- Continued emphasis on undergraduate research is encouraged.
- Continue the partnership with chemistry to enhance the pre-professional program.
- Take over administration and curriculum of Applied Health and Safety Science to continue building robust pre-professional health program. (See SHIH in this document for further details.)

Change from FY19

Addition of Applied Health and Safety Science is an increase of 1 FTE (FTE move from SME).

Business Information and Technology Department

Degrees Offered/Options

- BS Business and Information Technology, Accounting
- BS Business and Information Technology, Health Information Technology
- BS Business Information and Technology, Information Technology
- BS Business Information and Technology Management of Natural Resources
- BS Business Information and Technology, Management
- BS Business Information and Technology, Marketing
- BAS Business UM-Helena
- BAS Business, Accounting Track
- BAS Business Construction Management Track
- BAS Business Management Track

FY19 FTE = 7

Guideposts and Metrics

- **Guidepost 1:** Not designated as an S&E program.
- **Guidepost 3:** BIT does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** The program serves a very large numbers of students both in the program and in service courses. Program faculty teach high enrollment courses. Review of the metrics indicates that the business program is a strong performer in most categories. However, the program has experienced a significant enrollment decline during the AY 15/16-AY 17/18 periods (-147 students), with continued declines during the fall of 2018 (-13 students). This is contrary to national trends where demand for undergraduate business programs has remained strong.
- **Expenditures:** BIT has among the lowest relative instructional costs at Montana Tech, being - 34% below the Delaware peer group when comparing Expenditures Above National (SCH basis).
- **Research:** N/A

Overall Observations

The department is to be commended for their commitment to service and low program delivery costs when compared to peers.

The decline in enrollments of the business program track the overall decline in enrollments at Montana Tech. Although, the enrollment decline is understandable in this light, this is contrary to national trends where demand for undergraduate business programs has remained strong. The business program needs to stem enrollment declines and continue to be one of the more highly enrolled programs at Montana Tech.

Recommendation

- The Business program needs to take a careful look at its program offerings and structure. The program has too many degrees, options, etc. Multiple options in a program require departmental and institutional resources to offer and often have an adverse impact on overall

program quality. The department needs to review their current options and restructure the program to have a maximum of three options, preferably two. These changes will allow for a focus on quality and the potential to engage more students in undergraduate research.

- The Business and Information Technology Department has BS concentration in Health Information Technology. This degree could be modified to provide students with a strong foundation in Healthcare Informatics and Business. In order to support the success of this option, one FTE from HCI should be moved to BIT. The faculty moved from HCI would work with the faculty in BIT to design the curriculum.
- Consider keeping the undergraduate Certificate in HCI as part of BIT. The Certificate presents an opportunity to form some partnerships with Highlands College.
- Given the history and mission of Montana Tech, program faculty are strongly encouraged to partner with additional programs to make the Natural Resources Management option one of the pillars of the department.
- Consider pursuing a more rigorous ACBSP Accreditation instead of IACBE.

Change from FY19

No change in FTE (+1 FTE from HCI and -1 FTE from BIT)

Chemistry and Geochemistry Department

Degrees Offered/Options

- BS Chemistry Biochemistry Option
- BS Chemistry Professional Option
- BS Chemistry Environmental Option
- MS Geochemistry (Geoscience)

FY19 FTE = 7

Guideposts and Metrics

- **Guidepost 1:** Designated as an S&E program.
- **Guidepost 3:** Chemistry has a graduate degree. The department does engage in graduate and undergraduate research. Faculty serve as the research director for students completing graduate degrees.
- **Enrollment and Teaching:** Review of the metrics indicates that chemistry stands out by the contributions that it makes to service teaching. In this role, the department contributes to the success of students in programs throughout Montana Tech in SME and CLSPS. Enrollment was flat during the 15/16-AY 17/18 period, with an additional 8 students in the fall of 2018. The Service Course SCH Taught per Effective FTE Service Course Faculty during 15/16-AY 17/18 period are in the upper 20% of programs at Montana Tech. The number of degrees granted in the program is in the bottom 20% of all programs at Tech. The FTE Enrollment per Effective FTE Program Faculty ratio is in the lower 25% of Montana Tech programs during the AY 15/16-AY 17/18 period.

Chemistry had nearly flat enrollment during the AY 15/16-AY 17/18 period. During the fall of 2018 there were 28 majors, an increase of 6 students.

- **Expenditures:** Chemistry has high relative instructional costs, being 16% above the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** Engaged in research at an appropriate level given program resources and staffing. Successful in obtaining external support of work.

Overall Observations

The chemistry department has all of the elements in place to have enrollment growth. With enrollment growth program delivery costs will be reduced. Chemistry is an essential provider of service course offerings at Montana Tech.

Recommendation

- The department is encouraged to build upon the strong foundation of faculty scholarship and research. Undergraduate research presents a particularly promising area of focus.
- Continue the partnership with Biological Sciences to enhance the pre-professional program.
- Continue to enhance the Environmental Track through partnerships and collaborations.

Change from FY19

-1 FTE

Computer Science/Software Engineering Department

Degrees Offered/Options

- BS Computer Science Business Applications
- BS Computer Science Electronic Control Systems
- BS Computer Science Engineering Applications
- BS Computer Science Statistical Applications
- BS Computer Science Technical Communications
- BS Computer Science Health Care Informatics
- BS Computer Science Game Development
- BS Software Engineering Business Applications
- BS Software Engineering Electronic Control Systems
- BS Software Engineering Applications
- BS Software Engineering Statistical Applications
- BS Software Engineering Technical Communications
- BS Software Engineering Health Care Informatics
- BS Software Engineering Game Development

FY19 FTE = 5

Guideposts and Metrics

- **Guidepost 1:** Designated as an S&E program.
- **Guidepost 2:** CS/SE does not have a stand-alone graduate degree. The department does engage in undergraduate research.
- **Headcount:** AY 18-19: 5 FTE
- **Enrollment and Teaching:** The CS/SE program, with 70 majors as of fall 2018, indicates that it plays an important role at Montana Tech (11 out of 23 programs at Montana Tech). During the 15/16-AY 17/18 period enrollment in CS/SE suffered a slight decline. Recent data indicates that there appears to be an increase in student enrollment in the Computer Science BS (45 total students fall 2018) and a decline in the Software Engineering BS (25 total students fall 2018). During the 15/16-AY 17/18 periods, CS/SE has enrolled ~35 first-time freshmen.

CS/SE shares 50% of the administrative, instructional, and advising of the DS degree. This arrangement results in an additional 3.5 FTE of students that should be credited to CS/SE.

The metrics indicate that CS/SE does not stand out as a service oriented department or one that has high efficiency at teaching students in the program (*e.g.* relatively low numbers of SCH Taught per Effective FTE Program Faculty). The department is in the lower 50% of total degrees awarded during the 15/16-AY 17/18 period.

- **Expenditures:** CS/SE has the highest relative instructional costs at Montana Tech, being 84% above the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** Engaged in research at an appropriate level given program resources and staffing. Successful in obtaining external support of work.

Overall Observations

Given national trends in CS/SE, one would predict that this program would be experiencing robust enrollment growth. The reasons for the lack of enrollment growth in the program are likely due to a number of factors that are beyond the control of the program faculty. However, the program faculty do control the curriculum, and it is in this area where changes need to be considered. Growing a program through creating additional options and degrees does not work; the result of such an approach is not appealing to students, increases complexity, and requires the allocation of additional resources.

The department lacks a strong connection to the engineering programs at Tech. The engineering companies do not heavily recruit CS majors and the department has no major fiscal connections to industry (e.g., major gifts and/or endowments). Tech's engineering programs would benefit from better curricular content related to computing and computer science.

Recommendation

- Move the CS/SE program to SME. This would leverage the connections between CS/SE and programs/field in SME that are connected with CS.
- Data Science degree becomes housed and administered by CS/SE. Administration of the degree is in collaboration with statistics faculty currently associated with the Data Science degree.
- The CS/SE program has two BS degrees and each of these degrees have seven options (they are the same seven options for both degrees). Given the number of faculty in the department and the declining interest of students in the Software Engineering BS, the department needs to consider offering a single BS degree. This single degree could continue to have some options, but those need to be carefully considered to be targeted at the degrees in SME and CLSPS that have robust enrollments. Additionally, these options should require only those courses that are regularly taught as part of the other program curriculum.

Change from FY19

-1 FTE

Data Science and Statistics Department

Degrees Offered/Options

- BS Data Science
- BS Statistics

FY19 FTE = 3

Guideposts and Metrics

- **Guidepost 1:** Designated as an S&E program.
- **Guidepost 3:** Data Science/Statistics does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** Metrics indicate that DS/Stat does not have significant enrollments in either DS or Statistics. There is currently one student with a declared major in Statistics, a sophomore. There have been fewer than 3 freshman students per year entering the program majors during the AY 15/16-AY 17/18 period with three fall of 2018. Data science currently has seven students (half of these students counted as FTE for CS/SE). These low enrollments place Stat/DS near the bottom of average program enrolments at Montana Tech during the AY 15/16-AY 17/18 periods with only MPEM being lower. Stat/DS has the lowest average number of degrees awarded at Montana Tech during the AY 15/16-AY 17/18 period.

The Data Science and Statistics faculty teach a number of courses that provide a service to other programs on campus. This service load places the program in the middle of the pack (upper 50%) with about 2 of the 4 Effective FTE faculty teaching the service courses. Enrollment in Stat/DS has been increasing since program inception in the spring of 2017 to its current seven students, with all of the growth occurring in the Data Science program. Very low enrollment in a program will necessarily result in very low faculty-to-student ratios; Stats/DS has the lowest of Program SCH Taught per Effective FTE Program Faculty for AY 15/16-AY 17/18 for all programs presented in the data.

CS/SE shares 50% of the administrative, instructional, and advising of the DS degree. This arrangement results in an additional 3.5 FTE of students that should be credited to CS/SE. (This is a reduction of 3.5 student FTE for the Stats/DS program.)

- **Expenditures:** Stats/DS has very high relative instructional costs, being 50% above the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

The data presents a picture of a program that has low enrollment, has high delivery costs, and provides a modest amount of service. The DS program is a very new degree (major added to catalog Spring 2017), which could explain the low enrollment. In order for the program to become viable, it needs to be growing at a rate much greater than has been demonstrated to date. Given that the metrics point to this program not standing out in any particular area (enrollment, service, efficient delivery, research active, etc.), it becomes difficult to make the case for preservation as a stand-alone degree program in a stand-alone department.

Recommendation

- The Data Science and Statistics Department is eliminated.
- The Statistics degree is eliminated.
- The Data Science degree is moved to the department of Computer Science and Software Engineering. The degree is administered by CS/SE. Administration of the degree is in collaboration with statistics faculty currently associated with the Data Science degree.
- The three faculty FTE are moved to the Department of Mathematical Sciences.
- In consultation with faculty in mathematical sciences, consideration of an option and/or minor in Statistics.

Change from FY19

-3FTE; all faculty associated with this program are assigned to the Department of Mathematical Sciences.

Healthcare Informatics Department

Degrees Offered/Options

- BS, AS, Graduate Certificate Healthcare Informatics
- CT Certificate Healthcare Informatics

FY19 FTE = 3

Guideposts and Metrics

- **Guidepost 1:** Not designated as an S&E program.
- **Guidepost 3:** HCI does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** HCI has had a significant decline in program FTE during the past three years. In the fall of 2018, HCI had 19 students enrolled in the BS degree. This is a decline of six students from the previous year. There are currently no students enrolled in CT certification program. Program SCH is among the most significant percentage declines of all programs during the AY 15/16-AY 17/18 period. Fewer than three first-time freshman entered the program during the AY 15/16-AY 17/18 period.

HCI does not have a large service teaching component, residing at 35% of all programs in this category. The Service Course SCH taught per Effective Service Course Faculty during the AY 15/16-AY 17/18 period is in the bottom 30% of programs at Montana Tech.

- **Expenditures:** HCI has high relative instructional costs, being 16% above the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

The Healthcare Informatics program is well aligned with institutional mission. This is a program that is targeted to a national workforce need. The program is focused and of high quality. With its online focus, has the potential to reach beyond Montana to recruit students.

Healthcare Informatics is one of those programs that has all the ingredients for success; however, the program has not been able to recruit students to create a sustainable program. The largest barrier to success might be that the program is not fully online (~80%). Making the program fully online is difficult given that it is the courses that are not controlled by HCI faculty that need to be taught online (*e.g.* Computer Science). Unless Montana Tech makes significant commitments to the development and support of online courses in areas such as CS, it is unlikely that HCI will move to being fully online.

In most of the data categories presented as part of the program prioritization process, with few exceptions, HCI is in the bottom lower third of all BS programs at Montana Tech. Arguably, there is demand for graduates of this type of program, but this demand is not translating to students coming to Montana Tech for this degree. Enrollment trends tell the story of a degree that has been met with declining interest over time.

Recommendation

- Eliminate the Healthcare Informatics Department and all stand-alone degrees associated with the program.
- The Business and Information Technology Department has BS concentration in Health Information Technology. This degree could be modified to provide students with a strong foundation in Healthcare Informatics and Business. In order to support the success of this option, one FTE from HCI should be moved to BIT. The faculty moved from HCI would work with the faculty in BIT to design the curriculum.
- Consider keeping the undergraduate certificate in HCI as part of BIT.
- Suspend HCI grad certificate due to persistently low enrollment. Consider reactivating in a cohort model.

Change from FY19

-3 FTE (1 faculty going to BIT)

Liberal Studies Department

Degrees Offered/Options

- BS Interdisciplinary Arts and Sciences
- BAS General Science

FY19 FTE = 8

Guideposts and Metrics

- **Guidepost 1:** Not designated as an S&E program.
- **Guidepost 3:** IAS does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** The metrics indicate that the primary focus of IAS faculty is instruction in General Education/Service courses. The department is second only to mathematics in the total number of service course SCH. The number of SCH in service courses has declined by (~25%) during the AY 15/16-AY 17/18 period. IAS is a new major (2018) that currently has 12 students. The Liberal Studies degree being taught out, currently has 17 students. The Liberal Studies major saw enrollment declines over the AY 15/16-AY 17/18 period.
- **Expenditures:** IAS has low relative instructional costs, being -5% below the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

If the only consideration for continuation of the IAS degree were program cost and enrollment, the recommendation would likely be for elimination of the degree, while retaining program faculty to teach service courses. However, IAS is a critical degree option for those students at Tech who do not want to pursue a STEM degree. Toward this end, the program is structured for students to choose the IAS degree when they switch majors late in their academic careers. There is a possibility that the elimination of other programs through the PP process, particularly those that are not designated a S&E, will lead to increased enrollments in students pursuing an IAS degree.

The service function of the IAS department will continue to be a high priority of the program and Montana Tech. Program elimination in other areas will likely increase the number of students that need service courses provided by IAS faculty.

Recommendation

- Given the anticipated changes to programs that are closely allied to IAS, the program will need to carefully review their degree offering(s). This review might provide an opportunity to explore a more focused plan of study in the degree. The program may also need to consider developing

courses that address important, appropriate learning outcomes that were lost due to changes in other programs.

- Communications faculty (2 FTE) moved to Liberal Studies consider the creation of mission-driven options in areas like Health and Risk Communication, Environmental Ethics, and Data Communication and Visualization.
- See Professional Technical Communications section of this document for possible models for continuing to support graduate students who wish to pursue a Master's degree that has an emphasis in communications that is mission-related.
- Within two years the department should demonstrably increase curricular and research collaborations with science, engineering, and math departments across campus.
- Anticipating that IAS will be impacted by program eliminations/reductions in other areas of Montana Tech, and overall enrollment next year at Montana Tech, it is difficult to accurately predict program faculty needs. Between the 2016-2017 and 2017-2018 AY the program moved from 9 to 8 faculty FTE.
- Close coordination of the LS department and Highlands College has the potential to grow the BAS General Studies degree. This will likely require the creation of an articulated recruitment and retention plan, as well as rebranding. When it makes pedagogical sense for IAS faculty to teach courses in the Writing program, they should be utilized for that purpose.
- LS should assume administration, scheduling, and oversight of MUSI courses.

Change from FY19

+2 FTE from PTC.

Mathematical Sciences Department

Degrees Offered/Options

- BS Mathematical Sciences
- BS Mathematical Sciences, Applied Option

FY19 FTE = 7

Guideposts and Metrics

- **Guidepost 1:** Designated as an S&E program.
- **Guidepost 3:** Mathematical Sciences does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** Review of the metrics indicates that math stands out by the contributions that it makes to teaching service courses. The number of service course SCH has declined significantly (~25%) during the AY 15/16-AY 17/18 period. Math has a small number of majors, with modest enrollment growth over the most recent two years. The FTE Enrollment per Effective FTE Program Faculty ratio is in the lower 25% of all programs during the AY 15/16-AY 17/18 periods.
- **Expenditures:** Math has very low relative instructional costs, being -13% below the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

The knowledge and skills that are taught by program faculty in their subject areas are of high value to students enrolled in a wide variety of science, technology, and engineering programs at Montana Tech. The program does an excellent job in supporting students that arrive at Montana Tech who are underprepared in mathematics. The department has had success in working with providing math instruction to students at Highlands College. The faculty do engage in scholarship.

Mathematical Sciences is an essential program at Montana Tech that is critical to the success of students in every program. The program appears to be poised for a modest increase in majors.

Recommendation

- Program needs to consider offering a single, applied mathematics degree. Such a degree fits with Montana Tech's mission, best meets our student needs, and provides a clear program focus. Within that major, there could be Focus Group(s) to address high need areas; however, these would also need to be through an applied mathematics lens.
- The mathematics department should assume all administrative and instructional responsibilities of the Highlands program.
- Three FTE from Data Science and Statistics is moved to Mathematical Sciences department.

- Expectation that the department maintain its focus on student success including the continued development of co-requisite courses for all of its low-level offerings.
- Consider having qualified faculty on campus teach math courses.

Change from FY19

+ 3 FTE with the addition of the 3 FTE from Statistics/Data Science.

Networking Technology Department

Degrees Offered/Options

BS Network Technology/Options

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 1:** Designated as and S&E program.
- **Guidepost 3:** Network Technology does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** Review of the metrics indicates that the program has had flat enrollment during the AY 15/16-AY 17/18 period with an average of 41 students. Student credit hours have not had a significant decline over the same AY 15/16-AY 17/18 period. This program is linked with the two-year degree program at Highlands College. The most recent number of students graduating with the BS degree is five.
- **Expenditures:** Network Technology has low instructional costs being at the average of the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

This degree is the result of a collaborative effort between Highlands College and the North Campus of Montana Tech; student enrolled in the program start at Highlands College enrolled in the same courses that students pursuing the two-year Network Technology degree at Highlands. The four-year degree is delivered on the Highlands College campus. The program faculty are collaborative and make the entire program, both the two and four-year, work for students.

Recommendation

Highlands College has proposed some name changes and restructuring of program administration. These change should be enacted to provide more program focus and appeal for the degree. The inclusion of cybersecurity is a high priority.

Change from FY19

None

Nursing Department

Degrees Offered/Options

- BS Nursing, Pre-Licensure
- BS Nursing, Post-Licensure Completion

FY19 FTE = 10.92 (0.92 FTE is non-instructional)

Guideposts and Metrics

- **Guidepost 1:** Not designated as an S&E program.
- **Guidepost 3:** Nursing does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** The nursing program has the third-highest FTE enrollment of all programs at Montana Tech: average of 179 FTE during the AY 15/16-AY 17/18 period. In the fall of 2018 there were 218 FTE enrolled in the Nursing and Pre-Nursing programs. Review of the data indicates that the Nursing program ranks among the lowest of Program SCH Taught per Effective FTE Program Faculty for the AY 15/16-AY 17/18 period. Due to limitations in facilities and staffing, the Nursing program is currently at maximum instructional capacity in the Pre-Licensure degree.
- **Expenditures:** Nursing has high relative instructional costs, being 13% above the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

Nursing is well aligned to university mission. It is a tightly managed, high quality, focused degree program that has had large enrollment growth during the AY 15/16-AY 17/18 period. If additional resources were available (space, equipment and personnel) it is likely that further program growth of the residential program could be sustained. Fall 2018 Enrollments in the post-licensure program were disappointing.

Recommendation

- Focus on strategies to grow enrollments in the Post-Licensure program. Over the short-term, this is the area where additional enrollment can be supported.
- Consider an accelerated track in the Post-Licensure program.
- Explore the possibility of in-residence program delivery in Missoula through a partnership with the University of Montana.
- Explore ways in which to reduce the cost of program delivery. In many instances, it is understood that the faculty-student ratios are defined for many elements of program delivery; however, the program is encouraged to find those areas where class size can be increased without sacrificing program quality.

Change from FY19

No change (maintain current staffing).

Professional and Technical Communication Department

Degrees Offered

- BS Professional and Technical Communication
- BS Professional and Technical Communication, Health and Science Communication
- BS Professional and Technical Communication, Interactive Media
- BS Professional and Technical Communication, Public Relations
- Post-Baccalaureate Certificate Practice of Technical Communication
- MS Technical Communication

FY19 FTE = 4

Guideposts and Metrics

- **Guidepost 1:** Not designated as an S&E program.
- **Guidepost 3:** PTC does have a graduate degree: MS in Technical Communication (thesis and non-thesis). The department does not engage in significant amounts of research that engages graduate or undergraduate students. Faculty serve as the research director for students completing graduate degrees.
- **Enrollment and Teaching:** PTC is not in the top 25% of any metric category and is in the bottom 30% for several. There are currently 20 FTE in BS programs and 8 FTE enrolled in the MS. These numbers have not significantly changed over the past four years. There are 4.0 FTE faculty in PTC. The number of students in degree programs, although low, are comparable with a number of other programs at Montana Tech. During the AY 15/16-AY 17/18 period, three first-time freshman entered the program. Fall of 2018 two additional first-time freshman entered the program.
- **Expenditures:** PTC has very high relative instructional costs, being 79% above the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** The department does not engage in research that obtains external funding.

Overall Observations

The program provides a good option for students who are seeking a degree that is an alternative to a purely STEM degree. Alternative degree options such as PTC allows for students to remain at Montana Tech to complete their studies rather than having to transfer elsewhere and serves to attract a small number of students who are interested in the degree from the outset. Additionally, the program does offer courses that have the potential to contribute to the success of Montana Tech graduates in their career fields. The program attracts very few first-time freshmen. The MS degree attracts a moderate number of students, but lacks focus and does not generate significant external funding.

The data indicates that the cost of program delivery is one of the highest of all programs on campus. Contributing to this is that there are four faculty with a relatively small number (20 FTE) of students enrolled in the major.

Recommendation

- Elimination of the PTC program and all PTC degrees.
- Three faculty FTE associated with the program are retained with 2 FTE moved to Liberal Studies and one FTE moved to Writing.
- Communications faculty are moved to Liberal Studies consider the creation of mission-driven options in areas like Health and Risk Communication, Environmental Ethics, and Data Communication and Visualization.
- Creation of a mission-driven option in Liberal Studies will ensure that critical communications learning opportunities will continue to be available at Montana Tech as a degree option.
- There are a number of possible approaches to continuing to support graduate students who wish to pursue a Master's degree that has an emphasis in communications that is mission-related. Models that should be considered include:
 - Students utilize the Interdisciplinary Master of Science program. Because this program has built in collaborations with science and engineering departments, graduates will receive a rigorous curriculum of Technical and Scientific Communications.
 - Based on recent graduates and current students in the Masters of TC program, many students are already connecting their degree work through graduate projects with Science and Engineering (e.g. Computers Science, Mining, and Environmental Engineering). The IMS program will allow future Communications students to formalize these collaborations.
 - A potential alternative MS degree option for students that is discussed in the Research and Graduate School section of this document.

Change from FY19

-4 FTE (2 faculty going to PTC and 1 going to Writing)

Writing Program

Degrees Offered

- N/A

FY19 FTE = 4

Guideposts and Metrics

- **Guidepost 1:** Not designated as an S&E program.
- **Guidepost 3:** Writing does not have a stand-alone graduate degree. The department does not engage in significant amounts of research that engages graduate or undergraduate students.
- **Enrollment and Teaching:** Given that Writing is not a degree program, much of the data presented as part of the PP process does not apply. Writing is in the lower 50% of programs with Service Course SCH taught per Effective FTE for Service Course Faculty.
- **Expenditures:** Writing has low relative instructional costs, being -5% below the Delaware peer group when comparing Expenditures above National (SCH basis).
- **Research:** N/A

Overall Observations

The Writing Department is an essential service department that is responsible for the oversight and instruction in all writing courses at Montana Tech. This includes the coordination and scheduling of writing course offerings at Highlands College. It is a high quality program that is focused on student success.

The relatively low ratio of Service Course SCH Taught per Effective FTE for Service Course Faculty is probably due to relatively low enrollment caps on writing courses. This probably is not of major concern given that the program has a lower cost of program delivery when compared to Delaware peers.

Recommendation

- The Writing Program becomes responsible for the over-all coordination and delivery for writing at Highlands College.
- Do not merge Writing with IAS at this time. This could be considered at a later date, but if the Writing Program takes over the program at Highlands College, this needs to be the initial focus of the Writing Program director and faculty.
- Eliminate all Writing FTE from Highlands College. Move 1 FTE from PTC to provide adequate, qualified staffing to teach writing.
- Consider the conversion of the current 2 FTE Visiting Writing Instructor positions to permanent Instructor status. This will ensure program stability and quality.

Change from FY19

+1 FTE with the addition of the faculty line from PTC.

Program: Business Technology (BUS)

Credentials Awarded:

- CAS Office Assistant
- CAS Medical Receptionist
- AAS Business Technology – Medical Specialist Option
- AAS Business Technology – Administrative Computer Specialist option

FY19 FTE = 2

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Does not draw students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Program aligned with north campus degree
- **Enrollment:** Declining enrollment in Business Technology over the past 3 years with Fall 2018 enrollment down almost 50% from Fall 2015. (from 19-10).

Overall Observations

Neither option is producing a large number of graduates. Curriculum is not well aligned to current workforce needs, but faculty has been working with industry to strengthen their advisory board. Need to review CIP/SOC Crosswalks to improve alignment to industry needs.

Recommendation

- Recommendation is to eliminate the business/writing instructor position and have the Writing Department coordinate and teach the writing classes at Highlands
- Consider evenings and/or 8 week accelerated classes for low enrollment classes
- Utilize business faculty in providing non-credit/credit regional workforce training workshops to area businesses
- Develop/coordinate online business classes for short-term credentials
- Eliminate/merge low enrollment classes for cost savings
- Explore opportunities for dual credit classes and high school partnerships leading to business technology
- Re-evaluate program in two years due to low enrollment

Change from FY19

- 1 FTE

The Writing Department (CLSPS) will be responsible for the over-all coordination and delivery for writing at Highlands College.

Program: Accounting (ACTG)

Credentials Awarded:

- CAS Bookkeeping
- AAS Accounting Technology – Health Service Option
- AAS Accounting Technology – Human Resources Option

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Does not draw students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Program aligned with north campus degree
- **Enrollment:** Fall 18 enrollment 22; down from 31 in Fall 15.

Overall Observations

Combine the two options to have a larger enrollment than the Business Technology program. The combined SCH generation for the Business and Accounting programs remains under the 16:1 ratio.

Recommendation

- Consider evenings and/or 8 week accelerated classes for low enrollment classes
- Utilize accounting faculty in providing non-credit/credit regional workforce training workshops to area businesses
- Develop/coordinate online accounting classes for short-term credentials
- Eliminate/merge low enrollment classes for cost savings
- Explore opportunities for dual credit classes and high school partnerships leading to accounting technology

Change from FY19

No change in faculty

Program: Network Technology (NETW)

Credentials Awarded:

- AAS Web Development
- AAS Network Technology

FY19 FTE = 2

Guideposts and Metrics

- **Guidepost 2:** Matriculates to an S&E 4-year program
 - Ability to draw students from out-of-state
 - Designated as a O*NET STEM program
- **Guidepost 4:** Program aligned with north campus degree
- **Enrollment:** Enrollment in the Network Technology programs has remained steady, hovering between 41-42 FTE students per year.

Overall Observations

While enrollments have remained steady, the program struggles to retain students to second year. However, program expenditures are comparable to those included in the Delaware study. Credit hours generated through service courses is limited, but with a small faculty this is not unexpected.

Recommendation

- Due to the name change (Computer Networks and CyberSecurity) in the associate degree program students will see the value in a reverse transcript and request their associate's when they graduate with their bachelor's degree, since there is no additional cost to the student at the time of graduation
- Explore options for short term credentials and workforce development training
- Develop 6-9 credit Cybersecurity certificate for Electrical Engineering students
- Explore opportunities for dual credit classes and high school partnerships leading to network technology

Change from FY19

No change in faculty

Program: Nursing Assistant (CNA)

Credential Awarded:

CTS Certified Nursing Assistant

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Does not draw student from out-of-state
Not designated as a O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree
- **Enrollment:** This is difficult to measure because most students enroll either into the Medical Assistant program or under the AS program, depending upon their career goal.

Overall Observations

The CNA program struggles for many reasons. First, as a program it is not Financial Aid eligible, so our workarounds obscure the student intent. Second, there are many competitors on the market who deliver the program on-demand and in a shorter time period, which meets industry demand. Students employed in nursing homes and other medical settings can take this program free through their employer. Third, the last iteration of the TAACCCT grant helped develop apprenticeship models for the CNA program, so Montana Department of Labor and Industry and the Area Health Education Centers administer these programs.

Recommendation

- Recommendation is to eliminate the CNA 15-credit program and work in partnership with area High Schools and Adult Basic Education programs to help students earn the credential
- Utilize faculty to teach and coordinate non-credit/credit health classes
- Move forward on implementation of LPN program to meet the needs of the community and to recapture BSN students not accepted/failed BSN program
- Utilize faculty member as a healthcare industry liaison building partnerships with organizations and institutions that deliver healthcare throughout the region
- Revise/rename nursing fundamentals course to meet the needs of nursing assistant training
- Develop stackable credentials for working adults wanting to go into the healthcare field

Change from FY19

No change in faculty due to CNA faculty will teach non-credit/credit health classes

Program: Medical Assistant (AHMA)

Credentials Awarded:

AAS Medical Assistant

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Does not draw students from out-of-state
Not designated as an O*NET STEM program (Health Occupations are considered a science related second domain by Department of Labor - Bureau of Labor Statistics)
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Declining over the past 4 years, from 29 in Fall 2015 to 16 in Fall 2018.

Overall Observations

Retention is a significant problem for the program at 33% remaining in the program from year 1 to year 2 over the past 3 years. This is another program that will be facing competition from the Montana Department of Labor and Industry Apprenticeships in the future. That said, with an annual growth rate in demand of 2.36%, there will be ample opportunities for students in this field.

Recommendation

- Build 2+2 program with Biology Department to assist students interested in PA or Medicine
- Develop an optional pathway for MA students to obtain a Certificate of Applied Science (CAS) to compete with Gallatin College and Flathead Valley Community College's shorter MA CAS programs
- Reduce credits in MA AAS program by 9 credits to shorten graduation timeframe for students and reduce expense of program to college students
- Explore opportunities for dual credit classes and high school partnerships leading to medical assistant

Change from FY19

No change in faculty

Program: Radiologic Technology / Pre-Radiologic Technology (RADT) (PRAD)

Credentials Awarded:

AAS Radiologic Technology

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Does not draw students from out-of-state
Designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Pre-Rad Tech enrollment remains strong, with enrollments in the low 40s. Rad Technology holds at about 10 students per year in enrollment

Overall Observations

Strong program numbers, with good retention rates makes this a strong program. Projected growth for Rad Techs in the state is good, with average wages in the mid-\$50s indicate that the demand will continue. There may be some competition from the apprenticeships offered by Montana Labor and Industry to keep an eye on, but overall the outlook on this program is strong.

Recommendation

- Develop an optional distance education program to meet the needs of non-area students and to safely increase enrollment without burdening local healthcare facilities
- Establish lab/clinical sites to meet the needs of non-area students in Great Falls and Helena
- Explore opportunities for dual credit classes and high school partnerships leading to radiologic technology

Change from FY19

No change in faculty

New Program: Behavioral Health Technician (BHT)

Credentials Awarded:

CTS Behavioral Health Technician

FY19 FTE = 0 (The same faculty member teaches this program as well as the Medical Assistant)

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Does not draw students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree
- **Enrollment:** This is a new program that is not fully underway yet. It enrolled 4 students this fall, which was the first year it was available.

Overall Observations

This is not a financial aid eligible program, which will hinder its growth without a solid marketing strategy. This also means that the most likely participants will be working adults, which may require different marketing strategies for growth as well as different delivery mechanisms (evenings, online, accelerated, etc.).

Recommendation

- New Program Fall 2018
- Explore the possibility of embedding the CTS BHT in degree programs (which would make it financial-aid eligible for students pursuing those degrees)
- Deliver as both a credit and non-credit option
- Explore opportunities for dual credit classes and high school partnerships leading to CTS Behavioral Health Technician
- Re-evaluate program in two years due to low enrollment

Change from FY19

No change in faculty (The same faculty member teaches the BHT and Medical Assistant programs)

Program: Metals Fabrication (MFAB)

Credentials Awarded:

- AAS Metals Fabrication Technology
- CAS Machining
- CAS Welding

FY19 FTE = 2

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
Does not draw students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Over the past three years, enrollment has grown to 32 students this year.

Recommendation

- Consider breaking apart the current trades department structure into two separate departments
- Host summer workshops
- Work with industry regarding scholarships
- Work with Mechanical and Civil Engineering Departments on collaboration
- Explore opportunities for dual credit classes and high school partnerships leading to metals fabrication technology

Change from FY19

No change in faculty

New Program: Precision Machining (MCH)

Credentials Awarded

AAS Precision Machining Technology

FY19 FTE = 0 (one faculty member in this area is counted in the MFAB program.)

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
Does not draw students from out-of-state
Not designated as an ONet STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Current enrollment is 23.

Recommendation

- New Program Fall 2018
- Consider breaking apart the current trades department structure into two separate departments
- Host summer workshops
- Work with industry regarding scholarships
- Work with Mechanical and Civil Engineering Departments on collaboration
- Explore opportunities for dual credit classes and high school partnerships leading to precision machining technology

Change from FY19

No change in faculty

Program: Automotive (AUTO)

Credentials Awarded:

AAS Automotive Technology

FY19 FTE = 2

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
Does not draw students from out-of-state (Potential)
Designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Transitioning the program from a certificate to an Associate's degree initially increased enrollment, but this year enrollment dropped to 6 students.

Overall Observations

There is room to grow this program with the right marketing and industry partnerships. Strong occupational outlook with decent wages makes this a potentially strong program if we can partner with local dealerships and auto repair shops.

Recommendation

- Consider breaking apart the current trades department structure into two separate departments
- Consider evenings and/or 8 week accelerated classes for low enrollment classes
- Develop a career pathways model that incorporates stackable credentials
- Pursue NIASE certification, Snap-on Credentials
- Develop Diesel Mechanic and Hybrid Technology certificates
- Pursue partnerships with Helena College and Missoula College to deliver Automotive programs at those colleges
- Host summer workshops
- Work with industry regarding scholarships
- Work with Mechanical Engineering Department on collaboration
- Explore opportunities for dual credit classes and high school partnerships leading to automotive technology
- Re-evaluate program in two years due to low enrollment

Change from FY19

No change in faculty

Program: Construction (CNST)

Degrees Awarded:

- AAS Construction Technology- Carpentry
- CAS Carpentry

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
 - Does not draw students from out-of-state
 - Not designated as an O*NET STEM program
- **Guidepost 4:** Program aligned with north campus degree
- **Enrollment:** Enrollment has grown over the past two years, to 25 students currently enrolled.

Overall Observations

Construction is one of those careers that competes with both employers who need laborers on site, as well as the apprenticeship models that are used widely throughout the state. Aligning our programs to those apprenticeships will allow them to continue to grow, and increasingly colleges are becoming the owners of apprenticeship programs, which is a model that could work for Highlands moving forward.

Recommendation

- Consider breaking apart the current trades department structure into two separate departments
- Host summer workshops
- Work with industry regarding scholarships
- Work with Mechanical and Civil Engineering Departments on collaboration
- Continue to pursue pre-apprenticeship opportunities throughout the state
- Explore opportunities for dual credit classes and high school partnerships leading to construction technology

Change from FY19

No change in faculty

Program: Drafting (DRFT)**Credentials Awarded:**

AAS Drafting Technology

CAS Drafting

*FY19 FTE = 1**Guideposts and Metrics*

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
Does not draw students from out-of-state
Designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** The number of students enrolled in this program remains low, although enrollment in individual courses is much higher due to cross listing of courses between programs.

Overall Observations

While this program is indeed small, the courses fill because they provide courses to other programs. 60% of the credit hours generated in this program are “service” courses that enroll other students. Employment for Architectural and Civil Drafters remains high in the state as well as locally, and demand for these skills will grow over the next 10 years, making this a marketable program. Two other colleges in the state have Drafting Technology.

Recommendation

- Consider breaking apart the current trades department structure into two separate departments
- Consider program name change (example - Design Drafting Technology)
- Consider evenings and/or 8 week accelerated classes for low enrollment classes
- Host summer workshops
- Work with industry regarding scholarships
- Work with Mechanical and Civil Engineering Departments on collaboration
- Consolidate/share classes in the trades department that meet the needs of individual programs
- Explore opportunities for dual credit classes and high school partnerships leading to drafting technology
- Re-evaluate program in two years due to low enrollment

Change from FY19

No change in faculty

Program: Civil Engineering Technology (CET)

Credentials Awarded:

- CTS Land Surveying
- AAS Civil Engineering Technology

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
 - Does not draw students from out-of-state
 - Designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Enrollment was beginning to grow a few years ago, but enrollment dropped in AY17 and AY 18.

Overall Observations

Some of the enrollment drop is correlated to the timing of a faculty sabbatical. The job market remains viable for students in this program, particularly with only one other college in Montana offering this program.

Recommendation

- Consider breaking apart the current trades department structure into two separate departments
- Consider evenings and/or 8 week accelerated classes for low enrollment classes
- Consider merging the program with Drafting
- Consider developing a professional drone pilot certificate
- Work with Civil Engineering Department on collaboration
- Explore opportunities for dual credit classes and high school partnerships leading to civil engineering technology
- Re-evaluate program in two years due to low enrollment

Change from FY19

No change in faculty

Program: Line Program (LINE)

Certificates Awarded

CAS Pre-Apprentice Lineman

FY19 FTE = 1.06 (with one open position that is unfilled)

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program (Potential)
Draws students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Program not aligned with north campus degree (Potential)
- **Enrollment:** Holds steady at around 20-25 students.

Overall Observations

While this is a signature program, we struggle to keep instructors in the program. The pay for linemen is much higher than salaries to teach at Highlands. Northwestern Energy has recently reenacted an Industry Advisory Board to discuss the structure of the program as well as our staffing needs, in an attempt to help us recruit and retain qualified instructors at the salaries higher education pays. That said, the demand for lineman both in Montana and around the country remains strong, and there are likely opportunities to grow the program if we can solve the instructor issue.

Recommendation

- Consider breaking apart the current trades department structure into two separate departments
- Revitalize Industrial Advisory Board
- Work with Foundation and industry to offset instructor salaries
- Offer program continuously throughout the year (including summer)

Change from FY19

No change in faculty

Department: General Studies

Classes:

Math, Psychology, Sociology

FY19 FTE = 3

Guideposts and Metrics

- **Guidepost 2:** Does not matriculate to an S&E 4-year program
Not a program, does not draw students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Not a program, but provides service courses

Recommendation

- Recommendation is to eliminate the General Studies Department and have the Liberal Studies and Math Departments coordinate and teach the math, psychology, and sociology classes at Highlands
- Recommendation is to reduce the faculty by one position

Change from FY19

-1 FTE

The Math and Liberal Studies Departments (CLSPS) will be responsible for the over-all coordination and delivery for math, psychology, and sociology at Highlands College. Remaining faculty from the General Studies Department will remain as Highlands's faculty, be located at Highlands to teach assigned general education classes, and continue to be part of the MTYCFA bargaining unit. They will also be affiliate faculty for the north campus.

Department: ACES

FY19 FTE = 0.38

Recommendation

- Move reporting structure/staff under ACE (combine ACE and ACES)

Change from FY19

No change

- ACE and ACES will merge as one department (ACE).

Program: Associate of Science (AS)

Credentials Awarded:

Associate of Science

FY19 FTE = 1

Guideposts and Metrics

- **Guidepost 2:** May matriculate to an S&E 4-year program
Does not draw students from out-of-state
Not designated as an O*NET STEM program
- **Guidepost 4:** Program aligned with north campus degree
- **Enrollment:** The AS program remains the largest program at Highlands College, in spite of a drop in total FTE enrollment. Much of that drop can be explained by a change in placement policies that allow students with lower ACT scores to be enrolled in either FEP or FESP, where previously they would have been placed in the AS program.

Overall Observations

The AS program is mainly used as a 24-30 credit pre-engineering and science, pre-business, or pre-healthcare preparation program. It is vulnerable to any changes in the student enrollment process and cut scores used on north campus.

Recommendation

- The AS Student Learning Outcomes should be identical to the General Education Learning Outcomes used by the Montana University System and Montana Tech, and the degree program should become a transferable degree program regardless of the destination institution
- Guided Pathways should be well-developed to align with meta-majors, meaning that recommended plans of study will include gateway courses into specific majors when possible
- The AS program will collaborate with the Liberal Studies Department to meet the needs of the students
- With the elimination of the General Studies Department the AS program advisor/instructor will be a direct report to the Highlands Dean

Change from FY19

No change

Unit-by-Unit Non-Academic Recommendations

Chancellor Office

FY19 FTE = 2.0

Comments

Lowest administrative expense in the MUS based upon percentage of Institutional support as percent of net expenditures, per OCHE – latest numbers for FY19 budgeted https://mus.edu/data/operating_budgets/InstitutionalOpBudgetMetrics.asp

| | |
|--------------|-------|
| Montana Tech | 8.74% |
| MSU | 8.9% |
| UM | 9.8% |
| MSUB | 9.9% |
| Western | 10.9% |
| MSUN | 11.6% |

OCHE definition of Institutional Support is the program where most administrative expenditures are recorded. Expenditures for executive-level activities concerned with management and planning for the institution, legal services, fiscal operations, administrative data processing, employee personnel and records, purchasing, support services for faculty and staff, development, and alumni relations.

Concerns

Chancellor salary the lowest in OCHE peer group by 50% - may inhibit search

Recommendations

Reduce operating/capital by \$25,000

Cost savings

\$25,000

Change from FY19

0 FTE

Research Office and Graduate School

Degrees Offered (through SME and CLSPS)

- 1 Ph.D.; 12 Master's degrees (two via distance); 3 Graduate certificates (one via distance)

FY19 FTE = 0.83 Research Office and 0.42 Graduate School

Guideposts and Metrics

- **Guidepost 1:** Ph.D. program and all M.S. programs except TC and IMS are in S&E CIP codes. Most IMS individualized curricula strongly emphasize S&E. Two graduate certificates are S&E. Contract and grant expenditures (\$8.3 M in FY17) are 75% S&E and additional 19% education/outreach with strong S&E emphasis. Undergraduate Research Program (URP) is >90% S&E.
- **Guidepost 3:** On-campus graduate programs all are research intensive (thesis, project, practicum, or capstone). Research makes significant investments in research capacity, research infrastructure, faculty and student conference attendance, and new faculty start-up (small as it is). None of this funding comes from the operating budget, beyond \$40 K/year for part of URP.
- **Enrollment:** Grad school enrollment has grown by more than 50% in 5 years and is now over 250 (up from ~6% to ~10% of Tech's total).
- **Expenditures:** \$196 K from general budget in FY18, including URP. Grad school and RO are net revenue generators subsidizing other functions.
- **Research:** RO has helped raise grant competitiveness. Research expenditures up from \$11.7M in FY12 to \$13.1M in FY17, including 3 NSF MRI grants and major funding through CAMP for materials science and engineering research supporting faculty and students in ~6 departments. Overall proposal volume has risen about 50% since FY15 to 143 in FY18.

Overall Observations

Grad School, Research Office, Sponsored Programs Office, and Safety provide essential functions, which strongly support Tech's Special Focus mission and Guideposts 1 and 3. Concern about sustainability of CAMP, possible other Centers of Excellence, and continuing to grow competitive research funding.

Recommendation

- Establish M.Eng. (distance), MS in Restoration, & two more Ph.D. programs.
- Suspend HCI certificate due to persistently low enrollment; consider reactivating in cohort model.
- Enhance/rename/refocus 30-credit, coursework-only MPEM to broaden appeal, grow enrollment, and achieve its potential as a valuable and valued credential for individuals managing technical projects or seeking career advancement in this area. Possibly partner with employers to pre-enroll cohorts or for on-site short courses. Promising synergies between updated MPEM and M.Eng.
- Convene a multidisciplinary faculty team from across SME and CLSPS departments for an S&E-focused communications MS located in the Grad School with strong synergies with the I.M.S. and science/engineering M.S. and Ph.D. programs.
- Expand distance offerings supporting Master's degrees, where there is high demand by B.S.-educated workers in remote locations, including military.
- Match graduate enrollment to demand and capacity for each M.S. program.
- Develop strategy for funding meaningful start-up offers to attract faculty who will bring research funding and accelerate their grant success.

Change from FY19: None.

Academic Center for Excellence

Services Offered:

- Tutoring (Drop-in, Private Appointment, and Supplemental Instruction)
- Academic Coaching
- Incoming Freshman Registration (CLSPS)
- Director teaches 2 sections of MT1016 each term, does retention interventions, and campus outreach (seminar presentations, workshops, etc.)

FY19 FTE = 1.0

Metrics

- Montana Tech has the lowest student fee (\$10) associated with tutoring in the MUS (UM-Western is \$20). ACE offers ~ 70 hrs. of tutoring a week as compared to UM-Western offering ~28 hours
- Montana Tech has the smallest staff (1 person) compared to similar sized MUS schools and our Peer Institutions (Median is 3 people)
- Fall 2017/Spring 2018 293 individuals used ACE, totaling 1,834 visits
- 96% of students using ACE's services in 2017/2018 rated it as Great (85%) or Good (11%)
- ACE has received positive ratings on each annual program review (2014-2015, 2015-2016, 2016-2017, and 2017-2018).
- ACE has an operating budget of 1,750 dollars. In FY2017 and FY2018 it was zeroed out and ACE used its foundation account to cover all operating expenses

Overall Observations

ACE has done a great job serving students with minimal funding. In an effort to be fiscally responsible ACE monitors student employment hours with services hours each month. The director makes adjustments if hours worked becomes significantly higher than student hours serviced. With only 1 staff member if the Director is sick or out for vacation there is no one to manage the Center.

Recommendation

- Consider increasing the operation budget from \$1,750 to \$5,000. This would allow the director to have access to professional development and cover the cost of tutoring supplies.

Change from FY19

None.

Enrollment Services

Services Offered:

- Process all applications for admission and graduation
- Responsible for the management of all student's educational records and process all procedures associated with educational records
- Serve as the "one stop shop" for helping students, faculty, and staff navigate the institutional processes
- Management of the course schedule and catalog

FY19 FTE = 9.0

Metrics

- According to the American Association of Collegiate Registrars and Admissions Officers the recommended number of staff for a campus our size is 10.
- Department Heads, students, and administrators were surveyed in October 2018 and results indicated a high level of satisfaction overall with customer service being one of the strengths. Challenges facing the office include high level of turnover.
- Enrollment Services conducts over 4,000 course transfer evaluations per year
- Enrollment Services schedules 2,500 courses per year
- Processing materials is the bulk of Enrollment Services job; 47% is spent on registration, 26% on Applications for Admission, 14% on Graduation Applications, and 13% on Transfer Evaluations

Overall Observations

It is clear that enrollment services fulfills vital needs associated with our campus and they do these mandatory processes with limited staff. The Registrar/Director of Enrollment Services is in the process of drafting a strategic plan leveraging strengths towards opportunities for improvement.

Recommendation

- An advancement plan that rewards longevity should be drafted

Change from FY19

None

Financial Aid

Services Offered:

- Ensures compliance with Department of Education Title IV Funds
- Process all of Student Employment
- Manages all Financial Aid packages
- Manages all Financial Aid Appeals
- Hosts a Financial Aid Session on all campus visits

FY19 FTE = 4.0

Metrics

- National Association of Student Financial Aid Administrators recommends that with our Fall 2018 enrollment numbers we should have a minimum of 6 staff members, we currently have 4.
- 2015 official cohort default rate 12.4%, The national average is ~11%
- 68% of students apply for need based aid (\$5.6 Million is awarded)
- 56% of Montana Tech undergraduate students (North and South) receive a grant or scholarship, 30% have a Pell Grant, and 39% have federal student loans
- The bulk of our Financial Aid staff's time is dedicated to verifications/file reviews, loan processing, and scholarship management (which must be done); the least amount of time is spent on customer service and financial aid counseling.

Overall Observations

Our financial aid department is understaffed and barely able to be administratively capable. If the cohort default rate rises above 15% we can only do single disbursements for one semester and have to hold loans for 30 days for first time students. This could have dramatic impacts on new student enrollment.

Recommendation

- With an increased emphasis on rules and regulations by Department of Education and wanting to provide the best customer service possible the addition of a position should be considered. Best Practices dictate that two positions are needed, a recommendation of adding an Assistant Director position should be considered a priority and if possible a Financial Aid Specialist level I position should to be added in order to focus on default prevention counseling, campus visits, and customer service.

Change from FY19

None.

The Director retired June 30, 2018 and the Assistant Director was promoted to Director. The Assistant Director line was converted to a Financial Aid Specialist. In 2014-2016 there was a full-time Financial Aid specialist that focused on default counseling, financial literacy, and campus visits (it was a grant funded position) when the grant ended all of those duties were either absorbed or discontinued.

Student Development/Counseling

Services Offered:

- Dean of Students
- Disability Services/Mental Health Counseling
- International Services (includes HiSet testing/proctoring and Health Insurance)

FY19 FTE = 3.94

Metrics

- During Fall 2018 (July 1-Nov. 9) the Dean of students has overseen 18 non-academic conduct incidents involving 12 individuals, had 172 meetings with students, faculty, and/or staff, reviewed 19 student withdrawals, 33 appeals (Academic and Financial Aid), and had conversation with 14 parents.
- Disability Services: South Campus= 22 students; North Campus = 68
- Montana Tech's Student: Counselor ratio is 2583:1 and the National standard for is 1500:1
- South campus counselor has seen 23 individuals 94 times and the North campus counselor has seen 42 individuals 154 times so far this semester (Fall 2018)
- July 1-Nov. 9 International Services: conducted 120 international student SEVIS registrations, processed 3 International faculty visa/residencies, conducted 16 HiSet test sessions (6 on-campus, 10 off campus), proctored 15 individual exams, and processed 93 student health insurance cases

Overall Observations

Student development/counseling is able to get by with the current staff but the Dean of Student is often spending time working on tasks that could be done by an administrative associate instead of working on higher level institutional planning. Montana Tech's Dean of Students is the only one in the MUS that does not have an administrative associate. Disability Services is usually separated from Mental Health Counseling. At Montana Tech it is housed within the same position. Having counselor's/disability coordinators on both campuses is important. International Services position is needed but spread thin because of the other responsibilities. The lack of staff contributes to less services being available to students.

Recommendation

- An administrative associate should be considered to assist the Dean of Students and the Counselors/Disability Coordinators. It could be that this position is additionally shared with ACE and the Director of International Services (part-time for ACE/DIS and part-time for the Dean of Students and Counselors/Disability Services) This means 1 full-time associate could help four departments.
- For Fall 2019 a professional advisor should be hired to help combat student attrition.

Change from FY19

None

Undergraduate Recruitment

Services Offered:

- On the road recruitment
- Management of communication plan (digital and print recruitment)
- Recruitment Event Planning & Campus Visits/Tours
- New Student scholarships
- Interacting with students in the recruitment funnel (perspective, inquiry, applied, enrolled) ranging from Freshman to Seniors in High School (phone calls and email)

FY19 FTE = 8.5

Metrics

- Montana Tech's applicant to recruiter ratio is 337:1 and Public Universities less than 3,000 ratios is recommending to be 300:1
- Face-to-Face attention between students and recruiters at public universities with less than 2,750 students is recommend to be 74:1, Montana Tech is 134:1
- 2017-2018 Campus tour survey (N=840) 70% rated tour guide as outstanding, 29% rated tour guide as above average or average
- New freshman enrollment was up 10% over Fall 2017
- Recruitment hosts 15 events per year
- Montana Tech invested an additional \$10K in name acquisition for FY18-19 (26,889 vs 15,483)
- Fall 2019 freshman applications are up 181% over this time last Fall, Transfer Applications are up by 7.

Overall Observations

With recent investments in undergraduate recruitment we hope to see another increase in new freshman in Fall 2019. Transfer student numbers are down (primarily due to Canadian students).

Recommendation

- Continue to assess Undergraduate Recruitments efforts

Change from FY19

None

Alumni Engagement

Services Offered:

- Alumni Communication
- Alumni/Student Networking Events
- Reunions/Alumni Awards
- Executive Director Alumni Association
- Alumni Chapter Development
- Database Integrity
- Campus Department Collaboration
- Alumni Participation/contributions metrics
- Fundraising/Stewardship

FY19 FTE = 2

Metrics

- The Alumni Office uses several methods of communicating information to the Montana Tech alumni. Examples are quarterly newsletter, industry site visits Tech Town Hall, Social Media, and personal phone calls and emails.
- The Alumni Engagement Office completed 59 alumni/student networking events in FY18. Events completed for FY19 to date is 22. There are 8 additional events currently in the planning phase.
- The Alumni Office annual identifies alumni through reunions and recognition awards.
- The Alumni Engagement office continues to increase the footprint of Montana Tech across the United States and Canada. FY18 recognized 14 area chapters. Currently in FY19 there are 17 recognized chapters.
- The Alumni Office collaborate with Career Services to identify student interns for networking events and assists to identify alumni as mentors.
- The Alumni Office maintains and updates 13,656 living alumni recorded the Raiser's Edge Database daily. Comparison between FY17 and FY18 shows 75% increase in constituents added. 53% increase address changes. 130% increase in primary business updates. 64% increase in primary business information added, -9% LinkedIn Profiles added. 251% increase in Facebook profiles added.
- The Alumni Office collaborates with all departments on Montana Tech campus to provide mass email services through On Line Express and alumni identification /queries. FY19 to date saw 12 On Line Express emails distributed and 61 constituent queries distributed for campus departments.
- Alumni engagement and contributions monthly metrics. The goal for FY18 was 15 - 20% of actively engaged. FY18 ended with 19%. Individual alumni contributions remained flat at 9% for FY18. Alumni contributions to multiple funds increased FY18 20.07%. The goal of FY19 is to increase actively engaged alumni to 20-22%, alumni contributions to 10 -11%, and contributions to multiple funds to 20%.
- The Alumni Engagement Director's fundraising goal for FY19 is \$250,000.
- The Alumni Engagement Office saw a decrease from FY17 to FY19 of 27% in its operations budget.

Overall Observations

- The Alumni Engagement Office continues to increase alumni engagement, database integrity, and collaborations with campus departments and student organizations.
- With budget reductions the Alumni Office has drastically decreased the amount of hard mail that is sent to its constituents. The Alumni Office uses strategic methods in communicating with alumni through social media, email, and phone call correspondence.

Recommendation

Thirty percent of the Montana Tech alumni have graduated within the last 10 years. Individual conversations with alumni graduating in that time frame indicate a strong need in correspondence via social media or an online networking platform. The Alumni Office has reviewed several platforms that are available as well as those used by our peer institutions unfortunately the annual cost and manpower hours need are not available with the current budget provided by the state.

Change from FY19

None

Career Services

Services Offered:

- DIGGERecruiting – DR 2.0
- Career Coaching (Career Assessments, Appointments, Resume Reviews)
- Outreach – Class Presentations & Workshops
- Employer Visits & Career Fairs
- Experiential Learning & Internships
- The Outcomes Survey (also includes Alumni Career Services)
- Teach Employment Strategies (MT 0220) to students at Highlands College

FY19 FTE = 4.0

Metrics

- DIGGERecruiting – 2017-2018 total accounts – 1,435 students and alumni
 - DR 2.0 is slowly being implemented; total # active students - 932 (as of 11/9/2018)
- 2017-2018 Student Appointments – 193 Total | 40 Walk-in | 48 by Email
 - Fall 2018 Student Appointments 28 (as of 11/9/2018)
- 2017-2018 Proactive Student Resume Reviews – 498 (a decrease of 4.6% over last year)
 - Fall 2018 – 1,004 resumes reviewed (as of 11/9/2018)
- 2017-2018 Workshop – 20 Workshops with approx. 214 students
 - Fall 2018 – 3 Workshops with approx. 24 students (as of 11/9/2018)
- 2017-2018 Class presentations – 24 across depts./career-related topics | approx.616 students
 - Fall 2018 – 16 across depts./career-related topics | approx. 512 students (as of 11/9/2018)
- 2017-2018 Career Fair – Fall: 97 employer/ 772 students (Spring: 50 employers/287 students)
 - Fall 2018 - 111 employer/ 844 students
- 2017-2018 On-Campus Recruiting – 68 companies, 703 interview with 388 students
 - Fall 2018 - 66 companies, 758 interviews (as of 11/9/2018)
- Montana Tech has an efficient staff through working with faculty and departments across all colleges, reaching a higher percentage of students than our counter-parts in the state.

Overall Observations

Career Services collects and uses data to evaluate various services. The office consistently receives positive comments from employers about their recruiting experience at Montana Tech. The ability to provide detailed feedback to students is impressive given the small staff size. With the incoming students (Gen Z), more individualized, proactive attention will be required to ensure students meet employer expectations for career readiness. Employer development continues to remain a high importance not only for new, but existing too.

Recommendation

- Restoring the operational budget to FY18 numbers should be considered, would allow the staff to maintain software, develop new programs and activities, collaborate with other departments to reach more students, and cultivate new relationships with employers and alumni.
- Allowing income and keeping in place reserves for both the Students Fees and Career Fair accounts should be considered. This would allow continued collaboration with departments, supports student engagement, and gives the ability of the office to provide expected level of

customer services and events to students and employers despite changes in enrollment or the economy.

Change from FY19:

Reduced one FTE

Public Relations & Marketing

Services Offered:

- Community outreach
- Internal and external advertising, communications, marketing, and branding
- Video production
- Story and content writing
- Photography
- Brand licensing
- Alumni publication development
- Event planning
- Publication design and review
- Graphic design
- Web design and development
- Web updating and review
- Brand implementation
- Social media oversight
- Initiative and campaign development

FY19 FTE = 3

METRICS

- Designed over 1,000 design pieces. Print and web based, both small and very large scale.
- Continued to create a more consistent and recognizable brand
- Set standards on campus for departmental print pieces
- Increased media presence: 6,127 U.S. mentions and 7,711 global mentions, which compares to 5,334 U.S. mentions and 6,221 global mentions in FY17 and 3,692 U.S and 4,091 global mentions in FY16.
- Issued over 200 press releases to local and state media
- Website work included migrating content to new site. Previous site had over 1,000,000 assets (10/1/17 through 5/12/18)
- Website work (5/13/18 through 10/31/18)
 - Launch of new mobile-friendly website with no down time
 - 1,037 pages and downloadable documents (PDFs, Word documents etc.)
 - Maintain the website with an average of 200 edits per week
 - Published 55 news articles
 - Published 87 calendar events
 - Continual work on Search Engine Optimization and website accessibility
 - 160,026 unique visitors, 70.3% new and 29.7% returning
 - 1,411,779 page views
- Oversee social media channels which have continued to increase and engage with our audiences:
 - Facebook
 - January 2, 2018 – 9,033 page likes

- November 9, 2018 – 9,800 page likes
- Twitter
 - Gained 276 followers since Jan 2018 putting us at 2,170
- Instagram
 - On January 4, 2018, we had roughly 1,500 followers, now we have 2,378
- Produce two alumni magazines per year with stories focusing on faculty, staff, students, and alumni. MNews is mailed to approximately 14,000 alumni and friends in the US and Canada
- Coordinated and developed a number of videos about campus, alumni, and giving to add to our video library

OVERALL OBSERVATIONS

We need to continue to build relationships with educators across Montana and get in front of as many students as possible. Prior to about 2006, Montana Tech did not have a brand. Since then, a consistent, recognizable, strategic brand has been launched and executed. We are currently in a strong position to extend our brand further than we ever have in order to grow the campus.

Change from FY19

None

Facilities

Services Offered:

- Custodial services.
- Grounds keeping, includes snow removal.
- Security/Parking.
- Motor Pool.
- Maintenance of all buildings and projects.
- Carpentry/Painting

FY19 FTE = 39.35

Stakeholders Served and Metrics:

- Campus community – students, faculty and staff. Butte community and various vendors.
- The Association of Physical Plant Administrators (APPA) are the leaders in educational facilities and work in conjunction with NACUBO in setting metric service standards.
- Tech has approximately 472,000 square feet of office/classroom/lab space. 210 acres and 30 buildings.
- With current levels APPA puts Tech in the casual inattention to moderate dinginess category of clean. This can have an overall impact on potential students visiting campus – as well as their parents.
- Currently Security is funded out of the designated fund with 5.5FTE's (not included in the above 39.35 FTE count) for 24/7 coverage. An additional FTE could be covered by better parking control/ticketing revenue.
- APPR average metric for grounds keeper's states that we should have a minimum of 10 FTE's for the size campus versus the 3 FTE that we currently have.

Observations/Thoughts:

- Maintenance & Trades is considered adequately staffed. Where we fall short is not have a preventative maintenance program. Everything is done manually but with the implementation of the computerized management maintenance system (CMMS) this will be taken care of.
- Aging buildings and infrastructure.
- Director is currently analyzing future restructuring of the department for efficiency outcomes.
- Motor pool structure and available vehicles is also being evaluated.
- Currently implementing the CMMS that should produce cost savings in the long run. Will identify when filters need to be changed, etc.
- Evaluating an automated parking decal/ticketing system.

Change from FY19:

-1.25 pending LLC labor distribution determination and department restructuring.

Human Resources

Services Offered

- Provides information and guidance in areas of employee relations and employment.
- Labor relations and negotiations.
- Benefits and salary administration.
- Staff development.

FY19 FTE = 2.0

Stakeholders Served and Metrics

- Campus community – senior management, faculty and staff, OCHE, and outside companies.
- National metrics for HR are provided by CUPA/BNA/SHRM.
- Based on metrics Tech is significantly understaffed in HR. National university average is 1:82 employees. Minimum staffing is 1:100 employees which would be 5 FTE's in HR.

Observations/Thoughts

- Increasing liability and risk requires getting policies and procedures in place.
- Need for more formal and recurring faculty/staff training.
- Reorganize by moving payroll from finance to HR and consider adding additional staffing for both.

Change from FY19:

None

Finance & Budget

Services Offered

- Data Reporting for management, federal, state, OCHE.
- Provides financial analysis of enrollment, athletics, financials and budget information.
- Accounts payable and Procard
- Business Office – tuition billing and collections
- Purchasing
- Payroll and contract processing for all employees and students. This includes all adjunct contracts.

FY19 FTE = 10.0

Stakeholders Served and Metrics:

- Campus community – senior management, students, faculty and staff.
- Tech has the lowest Finance staffing in the MUS, 2 additional accountants is the minimum requested by Internal Audit and we would still keep Tech with the lowest staffed finance office.
- National metrics for payroll (PR) are provided by CUPA/BNA/SHRM.
- Average metric for payroll is 1:250. With 500 employees and 500 students that equates to 4 FTE's.

Observations/Thoughts:

- Staffing levels are inadequate, internal control and auditing of revenue producing areas in order to ensure compliance.
- Financial data analytics can drive management decision making.
- Many of the processes are paper driven so we are looking to implement automation where feasible and cost effective.
- Utilizing GrizMart for purchasing more items. This would automate accounts payable to a greater extent.
- In process of implementing automated faculty/staff contract issuing/tracking software.
- In process of evaluating Banner baseline timekeeping (would eliminate most paper timecards).
- Evaluating third party partner with Banner for delinquent student accounts.
- Preparing RFP for integrated time clock system.

Change from FY19

None

Information Technology Services

Services Offered

- Lab computers and support including all software.
- Provides local area network (LAN) to campuses and student housing.
- Provides wireless coverage on campus.
- Web services and telecommunications.
- Provides internet service, banner and many other programs.

FY19 FTE General Fund = -3.00

FY19 FTE Designated Fund = 10.00 + 3.00 – 1.25 = 11.75

Stakeholders Served and Metrics:

- Campus community – students, faculty and staff.
- Metrics are provided by Educause and indicate that the average tech support ratio should be 1 tech to 100-150 computers. Tech has approximately 1600 computers to maintain which would put our metric at 1:320.

Observations/Thoughts:

- No redundancy if a server fails, there are also no redundant switches for all the buildings on Tech which keeps the information flowing.
- Hardware and Data Center now over 10 years old, backup generator needs costly repairs, air conditioning unit is old and there is no redundancy. The uninterruptible power supplies are also starting to fail and need to be replaced.
- Lacking tools for monitoring of systems and security. A data breach is at a higher risk due to this which could have legal and financial implications.
- Staffing – both in number of staff and lack of market salaries.
- Increasing cost of all support for software and licensing.
- Wireless coverage for the campus. At current rate will take another 5 years to have 90% wireless coverage on the north campus.
- Restructured IT during FY2018 which resulted in overall salary cost savings of \$35,000 and the reduction of 1 FTE. The computer support technician positions (3 FTE) were moved from the general fund Deans departments to the designated fund to provide better customer service to the university.

Change from FY19

None

Institutional Research

Services Offered:

- Data Reporting for federal, state, OCHE.
- Provides analysis of enrollment, athletics, and finance.

FY19 FTE = 1.0

Stakeholders Served and Metrics:

- Campus community – senior management, faculty and staff
- The national average for staffing for institutional research for Tech's size is 3.

Observations/Thoughts:

- Increasing data reporting that is both Federal/State/OHCE mandated and internal requests for additional data is critical to the operation of the University.
- Data analytics can drive management decision making.

Change from FY19:

None

Distance Learning

Services Offered

- Technical support for online/distance learning community

FY19 FTE = 1

Stakeholders Served and Metrics

- Campus community: students, faculty, and staff
- Supports three distance-based graduate programs (HCI, IH, MPEM)
- Distance Learning Coordinator is the “go to” person for all campus distance education needs.

Observations/Thoughts

- This office will see more significance/importance when the Masters of Engineering Degree begins.

Change from FY19:

None. One FTE was eliminated last year.

Library

Services Offered

- Provides resources/services which support the academic/research needs of students, faculty, and the community.
- Hosts Montana Tech's Institutional Repository - *Digital Commons*.
- The only U.S. Patent Library in Montana.
- Interlibrary loans
- Hosts the Author's reception

FY19 FTE = 8.5

Stakeholders Served and Metrics

- Campus community
- Butte community

Observations/Thoughts

The Montana Tech library is an integral entity on the Tech campus. Accrediting agencies (NWCCU, ABET, etc.) continuously recognize the library

Change from FY19:

None

Institute for Educational Opportunities

Services Offered

- The Institute is the “Outreach” arm of the Tech campus.

FY19 FTE Current Unrestricted = 0.33

Stakeholders Served and Metrics

- Campus community
- Butte and surrounding area

Observations/Thoughts

IEO is responsible for the following outreach programs: Dual Enrollment, TRIO Pre College, TRIO SSS, GEAR UP, Jump Start, CFWEP, among others.

Change from FY19:

None

Athletics

Services Offered

- Montana Tech offers six varsity sports: Men's Football, Women's Volleyball, Men's Basketball, Women's Basketball, Men's Golf, and Women's Golf.
- A large number of Tech's student/athletes would not attend if they had not had the opportunity to participate in athletics.

FY19 FTE = 11.41

Stakeholders Served and Metrics

- Campus community
- Butte and surrounding area

Observations/Thoughts

Athletics has developed a strong relationship with campus recruiters to identify and recruit students that fit the academic profile of Montana Tech. Athletics is leading the recruiting efforts of out-of-state students through social media recruiting strategies. The campus should consider starting men's and women's cross-country team. Immediate impact would be 15-20 student athletes.

Change from FY19:

Reduce by One non-coach FTE, move ½ assistant coach salary to DAA.

Summary

| Program | Page Number | FY18 | Budget FTE Change | Budget Changes FY18 to FY 19 Notes | FY19 | Draft 2 Proposed FTE Change | Draft 2 Notes on Changes | Draft 2 Changes From FY19 |
|--|-------------|------|-------------------|---|------|-----------------------------|--|---------------------------|
| SCHOOL OF MINES AND ENGINEERING | | | | | | | | |
| Civil Engineering | 12 | 5.11 | -0.11 | 10 month to 9 month (-0.11) | 5 | | | 5 |
| Electrical Engineering | 13 | 4.78 | -0.67 | Moved to SME Dean (-1.00), Return from Sabbatical (+0.33) | 4.11 | 1 | Add 1 FTE (+1.00) | 5.11 |
| Environmental Engineering | 14 | 6.11 | | | 6.11 | -1 | Reduce by 1 FTE (-1.00) | 5.11 |
| Geophysical Engineering | 15 | 6 | | | 6 | -1 | Reduce by 1 FTE (-1.00) | 5 |
| Geological Engineering | 17 | 5 | | | 5 | | | 5 |
| Mechanical Engineering | 18 | 7.11 | | | 7.11 | 1 | Move a faculty member from Metallurgical (+1.00) | 8.11 |

| | | | | | | | | | |
|--------------------------------------|-----|--|------|-------|--|------|----|---|------|
| Metallurgy and Materials Engineering | 20 | | 5.5 | | | 5.5 | -1 | Move faculty line to Mechanical Engineering (-1.00) | 4.5 |
| Mining Engineering | 21 | | 5 | | | 5 | | | 5 |
| Petroleum Engineering | 222 | | 9.22 | | | 9.22 | -1 | Reduce by 1 FTE (-1.00) | 8.22 |
| Safety Health & Industrial Hygiene | 23 | | 6.16 | 0.17 | Retirement (-.50), Post Retiree (-.33), New Hire (+1.00) | 6.33 | | | 6.33 |
| Applied Health & Safety Science | 23 | | 1 | | | 1 | -1 | Move to Biology (-1.00) | 0 |
| Freshman Engineering | | | 2 | -1.00 | Retirement (-1.00) | 1 | | | 1 |
| HPER | | | 1.22 | -0.47 | Retirement (-.50), Move from football (+0.03) | 0.75 | | | 0.75 |

| COLLEGE OF LETTERS, SCIENCES, AND PROFESSIONAL STUDIES | | | | | | | | | |
|--|----|--|------|-------|--|------|----|---|------|
| Biological Sciences | 24 | | 7.42 | | | 7.42 | 1 | Move from Applied Health and Safety (+1.00) | 8.42 |
| Business & Information Technology | 25 | | 6 | 1.00 | Move from General Studies (+1.00) | 7 | 0 | Move from HCI (+1.00), Reduce Vacant Position (-1.00) | 7 |
| Chemistry/Geochemistry | 27 | | 6 | 1.00 | Faculty Returns from Leave (+1.00) | 7 | -1 | Reduce by 1 FTE (-1.00) | 6 |
| Computer Science/Software Engineering | 29 | | 6 | -1.00 | Assistant Professor (-1.00) | 5 | -1 | Reduce by 1 FTE (-1.00) | 4 |
| Data Science and Statistics | 31 | | 3.83 | -0.83 | Visiting Removed (-1.00) Return from Sabbatical (+0.17) | 3 | -3 | Move to Math Department (-3.00) | 0 |

| | | | | | | | | | |
|--|----|--|-------|-------|---------------------------------|-------|----|---|-------|
| Healthcare Informatics | 33 | | 3 | | | 3 | -3 | Program Eliminated (-3.00) 1 Faculty move to BIT | 0 |
| Liberal Studies | 35 | | 9 | -1.00 | Vacant Position Removed (-1.00) | 8 | 2 | Move from PTC (+2.00) | 10 |
| Mathematical Sciences | 37 | | 8 | -1.00 | Visiting Removed (-1.00) | 7 | 3 | Move from Data Science/Statistics (+3.00) | 10 |
| Network Technology | 39 | | 1 | | | 1 | | | 1 |
| Nursing | 40 | | 10.92 | | | 10.92 | | | 10.92 |
| Professional and Technical Communication | 41 | | 4 | | | 4 | -4 | Move to Liberal Studies (-2.00) Move to Writing (-1.00) Reduce by 1 FTE (-1.00) | 0 |
| Writing Department | 43 | | 4.5 | -0.50 | Retirement (-0.50) | 4 | 1 | Move from PTC (+1.00) | 5 |

| HIGHLANDS COLLEGE | | | | | | | | | |
|-----------------------|----|--|---|------|------------------------------------|---|----|----------------------|---|
| Business Technology | 44 | | 2 | | | 2 | -1 | Reduce 1 FTE (-1.00) | 1 |
| Accounting Technology | 45 | | 1 | | | 1 | | | 1 |
| Network Technology | 46 | | 2 | | | 2 | | | 2 |
| Nursing Assistant | 47 | | 1 | | | 1 | | | 1 |
| Medical Assistant | 48 | | 1 | | | 1 | | | 1 |
| Radiologic Technology | 49 | | 1 | | | 1 | | | 1 |
| Behavioral Health | 50 | | | | | 0 | | | 0 |
| Metals Fabrication | 51 | | 2 | | | 2 | | | 2 |
| Precision Machining | 52 | | | | | 0 | | | 0 |
| Automotive | 53 | | 1 | 1.00 | Moved from General Studies (+1.00) | 2 | | | 2 |
| Construction | 54 | | 1 | | | 1 | | | 1 |
| Drafting Technology | 55 | | 1 | | | 1 | | | 1 |

| | | | | | | | | |
|------------------------------|----|--|--------|-------|---|--------|-----|--|
| Civil Engineering Technology | 56 | | 0.67 | 0.33 | Return from Sabbatical (+0.33) | 1 | | 1 |
| Line Program | 57 | | 1.06 | | | 1.06 | | 1.06 |
| General Studies | 58 | | 5 | -2.00 | Moved to BIT (-1.00), Moved to Automotive (-1.00) | 3 | -1 | Department Eliminated (-3), 2 Faculty reassigned in Highlands (+2) |
| Change in Faculty | | | 153.61 | -5.08 | | 148.53 | -10 | 138.53 |
| Associate of Science | 60 | | 1 | | | 1 | | |

| Program | Page Number | FY18 | Budget FTE Change | Budget Changes FY18 to FY 19 Notes | FY19 | Draft 2 Proposed FTE Change | Draft 2 Notes on Changes | Draft 2 Changes From FY19 |
|--------------------------------|-------------|------|-------------------|---|------|-----------------------------|--------------------------|---------------------------|
| OTHER | | | | | | | | |
| ACES | 59 | 0.76 | -0.38 | Program Coordinator II (-0.38) | 0.38 | | | 0.38 |
| Chancellor's Office | 61 | 2 | | | 2 | | | 2 |
| Research Office | 62 | 0.83 | | | 0.83 | | | 0.83 |
| Grad School | | 0.42 | | | 0.42 | | | 0.42 |
| Academic Center for Excellence | 64 | 1 | | | 1 | | | 1 |
| Enrollment Services | 65 | 9 | | | 9 | | | 9 |
| Financial Aid | 66 | 4.5 | -0.50 | Remove Assistant Dir (-1.00), Increase Financial Aid Specialist (+0.50) | 4 | | | 4 |
| Student Development/Counseling | 67 | 3.94 | | | 3.94 | | | 3.94 |
| Undergraduate Recruitment | 68 | 7 | 1.50 | Add Admissions Rep II (+1.00), Admin Associate (+0.50) | 8.5 | | | 8.5 |
| Alumni Engagement | 69 | 2 | | | 2 | | | 2 |

| | | | | | | | | | |
|--------------------------------|----|--|-------|-------|---|-------|-------|-------------------------|------|
| Career Services | 71 | | 4 | | | 4 | -1 | Reduce 1 FTE (-1.00) | 3 |
| Public Relations and Marketing | 73 | | 3 | | | 3 | | | 3 |
| Human Resources | 76 | | 2 | | | 2 | | | 2 |
| Facilities | 75 | | 37.25 | 2.10 | Add Groundskeeper (+1.00), Custodian (+0.50), Maintenance Engineer (+0.50), Program Assistant from Designated (+0.10) | 39.35 | -1.25 | Reduce 1.25 FTE (-1.25) | 38.1 |
| Finance & Budget | 77 | | 9.66 | 0.34 | Increase Admin Associate II (+0.50) Retirements (-0.16) | 10 | | | 10 |
| Institutional Research | 79 | | 1 | | | 1 | | | 1 |
| Distance Learning | 80 | | 2 | -1.00 | Director of Distance Learning (-1.00) | 1 | | | 1 |
| Library | 81 | | 8.5 | | | 8.5 | | | 8.5 |

| | | | | | | | | | |
|--|-------------------|--|--------|-------|---|--------|-------|---|--------|
| Institute for Educational Opportunities | 82 | | 0.33 | | 0.33 | | | 0.33 | |
| Athletics | 83 | | 11.35 | 0.06 | Movement of Coach and ICA (+0.06) | 11.41 | -1.5 | Reduce 1 FTE (-1), Move .5 Coach to DAA (-.5) | 9.91 |
| Information Technology (Instruction Non Faculty) | 78 | | 3 | -3.00 | Computer Support Specialists Moved to Designated (-3.00) | 0 | | | 0 |
| Instruction Non Faculty Excluding Information Technology | | | 17.15 | -1.15 | Admin Assoc (-0.50), Instrument Manager (-0.23), Special Projects (-0.50), Dean (+0.08) | 16 | | | 16 |
| Non Faculty Change | Net Change in FTE | | 110.54 | -2.03 | | 112.66 | -3.75 | | 108.91 |

Auxiliary

| Program | Page Number | FY18 | Budget FTE Change | Budget Changes FY18 to FY 19 Notes | FY19 | Draft 2 Proposed FTE Change | Draft 2 Notes on Changes | Draft 2 Changes From FY19 |
|--------------------------|-------------|--------------|-------------------|--|--------------|-----------------------------|--------------------------|---------------------------|
| Residence Hall | | 3.5 | 0.00 | | 3.5 | | | 3.5 |
| Apartment Housing | | 0.5 | 0.00 | | 0.5 | | | 0.5 |
| Dining Services | | 20 | 0.00 | | 20 | | | 20 |
| Parking | | 0.5 | 0.15 | Program Assistant (+0.15) | 0.65 | | | 0.65 |
| Bookstore | | 3.5 | -0.40 | Custodian (-0.40) | 3.1 | | | 3.1 |
| Student Activities | | 4.5 | -0.60 | Custodian (+0.40), Program Manager (-1.00), Admin Associate (-1.00), Coord Conferences & Special Events (+1.00) | 3.9 | | | 3.9 |
| Health Services | | 0.06 | 0.00 | | 0.06 | | | 0.06 |
| Total Auxiliaries | | 32.56 | -0.85 | | 31.71 | | | 31.71 |

Designated

| Program | Page Number | FY18 | Budget FTE Change | Budget Changes FY18 to FY 19 Notes | FY19 | Draft 2 Proposed FTE Change | Draft 2 Notes on Changes | Draft 2 Changes From FY19 |
|-----------------------------|-------------|------|-------------------|---|------|-----------------------------|--------------------------|---------------------------|
| Instructional Lab Fees | | 1 | 0.00 | | 1 | | | 1 |
| Digger Card Center | | 1 | 0.00 | | 1 | | | 1 |
| HPER | | 0 | 0.00 | | 0 | | | 0 |
| HPER Pool | | 1 | -1.00 | Assistant HPER Director (-1.00) | 0 | | | 0 |
| ICA -Gate Receipts | | 0.08 | -0.04 | General salaries | 0.04 | | | 0.04 |
| Conferences & Workshops | | 2.4 | 0.00 | | 2.4 | | | 2.4 |
| ASMT | | 0 | 0.00 | | 0 | | | 0 |
| Sales & Service | | 3.73 | -0.10 | High Performance Computer Scientist (+0.05), Misc. salaries (-0.15) | 3.63 | | | 3.63 |
| Indirect Costs | | 5.15 | 0.10 | Vacancy Savings in FY 18 | 5.25 | | | 5.25 |
| Service Shop-Physical Plant | | 3 | -1.00 | Construction Project Manager (-1.00) | 2 | | | 2 |
| Security | | 5.5 | 0.00 | | 5.5 | | | 5.5 |
| Central Duplicating Office | | 2 | 0.00 | | 2 | | | 2 |

| | | | | | | | | | |
|--|----|--|-------|-------|--|-------|--|--|-------|
| Information Technology (Includes Information Services, Network Services, Telecommunications, and Web Management) | 78 | | 10 | 1.75 | IT from Current Unrestricted (+3.00), Director of Communications (-1.00), Program Assistant move to Aux and State (-0.25) | 11.75 | | | 11.75 |
| Work Study | | | 0 | 0.00 | | 0 | | | 0 |
| High Performance Computer | | | 0.15 | -0.15 | High Performance Computer Scientist (-0.15) | 0 | | | 0 |
| Workers Compensation | | | 0.5 | 0.00 | | 0.5 | | | 0.5 |
| Total Designated | | | 35.51 | -0.44 | | 35.07 | | | 35.07 |

APPENDIX A. Complete WIRE Recommendations

Executive Summary

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 entities to discuss the impact of the new classification. Since April of 2017, WIRE has met with numerous groups both on and off campus to create a set of recommendations for Chancellor Blacketter. This report contains the preliminary recommendations of the group.

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

Montana Tech recognizes the need for an informed citizenry prepared to understand issues related to energy, natural resources, environment, water, data, and health. We recognize that the highly technical nature of these problems presents an obstacle to creating that informed citizenry. We recognize that Montana Tech’s mission, legacy, culture, and values promote proven solutions to these challenges.

Montana Tech embraces the opportunity to pursue its special focus designation by becoming the science and engineering institution of choice to solve these problems now and in the future. Montana Tech will have an ethos of educating the whole person through intensive intellectual dialogue between students and faculty across diverse spheres of inquiry.

Fulfilling our vision will require several institutional changes including:

- An institutional name that reflects our values, vision, and aspired national stature. The “of the University of Montana” invokes a regional scope that is not reflective of our role as a Special Focus Institution. WIRE strongly supports that our name change to match our brand of “Montana Tech”.

- The Chancellor should continue to report directly to the Commissioner level. This reporting line gives Montana Tech the ability to pursue collaborations with all other institutions in the MUS and beyond
- Entrance standards should measure the potential of students to succeed at Montana Tech.
- A physical and organizational restructuring that will support instructional collaboration, increased research output, and a strong general education curriculum
- Appropriate tuition/fee rates to enable Tech to offer nationally competitive programs
- Mission driven MS and PhD in focused areas of Science and Engineering
- Curricular modification/development to facilitate effective multi-disciplinary and experiential learning for all majors
- Appropriate faculty pay scales, benefits, tenure and promotion standards, workload, and incentives to attract and retain scholars

Some of these actions have obviously already been achieved fully or in part, with the rest still needing to be addressed or completed.

History of WIRE

In April of 2017, Chancellor Blacketter formed the Workgroup for Institutional Realignment for Excellence (WIRE). Thirteen staff and faculty members were appointed to WIRE and charged with determining how Montana Tech would need to adapt to fulfill the institution's new role as a "Special Focus" institution. From April to December of 2017, WIRE members solicited feedback from the following groups:

| | | |
|-----------------------------------|---|--|
| Biological Sciences | Metallurgical and Materials Engineering | Administrative Associates |
| Business Information & Technology | Nursing | CLSPS department heads |
| Business Technology | Petroleum Engineering | SME department heads |
| Chemistry & Geochemistry | Professional & Technical Communication | Highlands department heads |
| Civil Engineering | Safety, Health, & Industrial Hygiene | Business office |
| Computer Science | Trades & Technical | Library |
| Electrical Engineering | Writing | Network Services |
| Environmental Engineering | Student Affairs | Institute of Educational Opportunities |
| General Engineering | Staff Senate | Highlands staff members |
| Geological Engineering | Office of Research and Sponsored Programs | CTS |
| Geophysical Engineering | CAMP | Industrial Advisory Boards |
| Freshman Engineering | MBMG | Chris Maples (Missouri S&T) |
| Mechanical Engineering | Foundation Board | Joe Thiel (consultant) |
| Network Technology | Alumnae/Alumni | Gallatin College Administrators |
| Liberal Studies | | The Commissioner of Higher Education |
| Mathematical Sciences | | Program Prioritization Committee |
| Mining Engineering | | |

WIRE used the feedback gathered from these groups, extensive research of trends in higher education, employment predictions, and aspirational peer institutions to create the preliminary recommendations contained in this report. WIRE embraces Montana Tech's mission and historical values. Our vision is to create an institution with a national reputation for excellence in the fields of Science and Engineering, a vision that serves the citizens of Montana, the nation, and the world. All our academic programs will have a Science and/or Engineering foundation with a special focus on solving society's most pressing

problems. WIRE recognizes the importance of institutional collaboration within the Montana University System and beyond to enable Montana Tech to achieve the aforementioned national reputation.

Sincerely WIRE members,

Dan Trudnowski (co-chair)

Brian Kukay

Jack Skinner

Hilary Risser (co-chair)

Rita LaMiaux

Matt Stepan

Michael Barth

Scott Risser

Glen Southergill

Peggy Delaney

Scott Rosenthal

Trisha Southergill

Carrie Vath

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

Montana Tech is committed to building upon its legacy as the Montana State School of Mines. We recognize that the world needs energy solutions that include coal, oil, natural gas, renewable energy, mineral extraction and mineral processing. We recognize the irreplaceable benefit that energy and minerals bring to our daily lives and the complex relationship between natural resource extraction and the environment. We believe Montana Tech must provide extraction and delivery solutions that sustainably maintain and improve our environment, mitigate previous environmental damage, and uphold our conservation values held by Montanans and beyond. Montana Tech is committed to educating graduates who will be future leaders that find effective and affordable means to balance our growing needs with our environment.

Montana Tech recognizes that the needs of the state of Montana and society-at-large have evolved considerably since our founding in 1900. The National Academy of Engineering¹ has identified 14 Grand Challenges for the 21st century. These challenges fall into four general categories: sustainability, health, security, and joy of living. Montana Tech, with its strong legacy in science and engineering education is uniquely poised to help solve problems from all four of these areas. Montana Tech has strong programs in the health sciences, technology, scientific communication, and data analysis that will be instrumental in solving these 21st century problems.

Montana Tech realizes that today's graduates in science and engineering fields need more than just strong technical skills. The American Society for Engineering Education² has identified 15 high priority knowledge, skills, and abilities that all graduating engineers should have. These skills include: communication skills, curiosity, motivation, business acumen, critical thinking, and high ethical standards. Typically, curricula design develops students' technical skills through coursework in their program of study and soft-skills through participation in general education. However, the structure of general education does not always support the development of these skills. As described by Colleen Flaherty "The road to general education curricula is paved with good intentions, namely to round out students' educations and maybe even help them lead more meaningful lives. But over time those intentions are forgotten and programs become stale. Often, students don't know why they're required to take certain courses beyond their majors, and professors aren't sure, either"³. Montana Tech will intentionally design our curriculum, including our general education program, will be intentionally designed to support the development of both the technical and soft-skills that scientists and engineers will need to succeed.

¹ <http://www.engineeringchallenges.org/challenges.aspx>

² https://www.asee.org/TUEE_PhaseI_WorkshopReport.pdf

³ <https://www.insidehighered.com/news/2018/01/29/colleges-share-how-they-made-their-general-education-programs-more-laundry-list>

Goals:

Montana Tech expects about half of our graduates will be from **engineering programs** and the majority from programs that are **anchored in the sciences**.

Where we are now... Currently, a little over 40% of our graduates (Associates, Bachelors, Masters, and PhD) receive degrees in engineering. Approximately 75% of our graduates receive degrees in a STEM discipline or in the health sciences. We also have unique programs outside of STEM and Health (e.g. Technical Communications, Integrated Arts and Sciences, and Business with a focus in Natural Resource Management) that are aligned to our mission.

Where we are headed...

- About half our graduates will be from engineering programs
- About 80% our graduates will be from programs that are anchored in the sciences
- Campus program and curricular approval forms will be modified to include information about how the new curriculum and/or program will support the special focus

Montana Tech will ensure that all graduates have both the **technical and soft-skills** needed to make them sought after employees.

Where we are now... Our current approach to general education follows a distribution model. Students select courses from a set of six core areas. These core areas are intended to help students develop both technical and soft skills. In some cases, majors require students to take specific courses in different areas to ensure that students develop needed core skills. For example, our engineering programs require students to take specific math, science, and writing courses. In other cases, students are left to decide which courses to take.

Where we are headed...

- We will analyze the current structure of our general education program with the goal to determine whether all students participating in general education are developing both technical and soft-skills.
- We will revise our assessment practices in general education courses to measure development and proficiency of specific skills
- We will use the results of the analysis to redesign our general education program.

We will position Montana Tech as the **school of choice** for engineering, science, and technical programs, as well as an institution known nationally and internationally for excellence in undergraduate education, applied research, high-demand graduates, and leadership.

Where we are now... Montana Tech has received awards for the Best Value Engineering School⁴, Colleges with the highest paid graduates⁵ and Top 10 Best Public Universities for ROI⁶. The recognitions we have received are in a few select areas and do not reflect a national reputation.

⁴ <https://www.bestvalueschools.com/rankings/engineering-schools/>

⁵ <https://www.cnbc.com/2017/09/14/college-where-graduates-earn-highest-salary-in-every-state.html>

⁶ <https://www.mtech.edu/news/2015/03/030320151.html>

Where we are headed...

- Remain the top Best Value Engineering School
- Improve our ranking with USNews Best colleges (regional Colleges West, Top Public schools, Best Value Schools, and Best Colleges for Veterans⁷)

Our **recruitment and admission processes** will seek out students with strong motivation, intellectual curiosity, creativity, and a determination to succeed.

Where we are now... Currently, standardized test scores and high school coursework determine admission to Montana Tech programs. Relying primarily on high standardized test scores for admission does not lead to higher graduation rates and limits the diversity of the admitted students.⁸

Where we are headed...

- We will identify qualities that are predictive of success in our programs.
- We will investigate quantifiable criteria that measure these aforementioned qualities. Options could include: becoming test score optional, factoring high school GPA into admissions, or allowing students to submit essays, portfolios, or other materials.

We will provide **resources** that help students to succeed.

Where we are now... We currently have multiple departments offering academic support services (professional tutors, peer tutors, online tutoring, academic coaching, and supplemental instruction) to students. The Library provides a first floor that encourages talking and eating to foster a welcoming and friendly atmosphere and the second floor has collaborative study rooms, our Librarians teach life-long learning, information literacy, and critical thinking skills through classroom presentations, and our institutional repository, digital commons, promotes student and faculty academic work to a global audience that is indexed in google.

Where we are headed...

- *Streamlining academic support services to ensure that time and money are spent in the most efficient ways that improve student success*
- *Implement a professional advising center to increase retention among freshman, sophomores, and at-risk students.*

Our faculty will be committed to their disciplines' code of ethics and our students will value and **respect the campus honor code**.

Where we are now... Currently the campus has an academic dishonesty policy, not an honor code. Studies have shown a relationship between rationalization for engaging in academic dishonesty

⁷ <https://www.usnews.com/best-colleges/montana-tech-2531>

⁸ Myers, B. A. (2016). Evaluating admission practices as potential barriers to creating equitable access to undergraduate engineering education (Doctoral dissertation, University of Colorado at Boulder).

and rationalization for engaging in unethical behavior in a workplace setting⁹. This relationship underscores the importance of creating an academic culture that values ethical behavior.

Where we are headed...

- The campus will embrace academic integrity and develop an honor code that emphasizes ethical behavior and creates a culture that makes most forms of serious cheating socially unacceptable among the majority of students.
- Faculty will embrace the student honor code by including: an honor code statement in the syllabus, an honor pledge as a front page that all students must sign before taking an exam, and consider instructor optional un-proctored exams.
- The campus will develop a non-academic student conduct code with input from student leadership.

⁹ Harding, T. S., Carpenter, D. D., Finelli, C. J., & Passow, H. J. (2004). The influence of academic dishonesty on ethical decision making in the workplace: A study of engineering students. Proceedings of the ASEE Annual Conference and Exposition, Salt Lake City, UT.

Recommendation II:

Montana Tech will have a nationally competitive applied research culture

Applied research seeks to answer tangible questions, to solve real-world problems, and develop innovative technologies. More than 80% of research and development in the US is applied research, yet very little applied research is done at colleges and universities¹⁰. Montana Tech has a legacy of strong applied research. Today, Montana Tech has a few pockets of successful, seeds of potentially successful, nationally competitive research programs. These include research programs in materials sciences and engineering, geosciences and geochemistry, and electric power systems.

The MUS has long recognized that “graduate students are a mainstay of research productivity in science and technology. A concerted effort to recruit, retain, and graduate the most talented graduate students from the state, region, nation, and world will pay off in research productivity and in long term, economic development - as many of these students - wherever they originated will want to pursue their careers in Montana.”¹¹ Successful research programs have a mix of MS and PhD students. PhD candidates enable depth and stability to research projects that often lack with programs only staffed with MS students. A second and fast-growing model for advanced education is non-research-based master’s degrees (e.g. Masters of Engineering). Professional graduate education in coursework only terminal degree programs that can provide a path for professional advancement, satisfy professional licensure requirements, or broaden technical knowledge. The infrastructure required to offer a quality tuition-based graduate program significantly overlaps those of a quality research program (e.g., highly qualified faculty).

The foundation of successful research and graduate programs are the faculty. We recognize our undergraduate teaching is a significant strength and desire to maintain this, but we also recognize that we must embrace a wider perspective in faculty recruitment, development, evaluation, and retention to support our research goals. Factors such as a balance between teaching and research responsibilities and lab facilities can help to attract high-quality faculty to a university¹². Successful graduate programs also require a management structure that enables many necessary components such as operational policies, inter-department collaborations, inter-MUS collaborations, appropriate funding mechanisms, government and industrial relationships, and graduate student recruiting, marketing and quality control. Today, Montana Tech’s management structure primarily focuses on delivering specific undergraduate programs. While this serves to maintain the quality and consistency of those undergraduate programs, it discourages collaborations often necessary in research.

We recognize that shifting Montana Tech to have a stronger research and graduate education focus requires investments of resources and human capital, however, we also believe that if this is to be executed correctly, the fiscal costs will be captured through an increase in external funding and an increased number of graduate students. The net benefits to Tech are significant. Institutions that lead technology are educational leaders and the seed for meaningful economic development.

¹⁰ <https://www.nsf.gov/statistics/2018/nsb20181/digest/sections/u-s-r-d-performance-and-funding>

¹¹ https://mus.edu/research/MUS_STPlan_2015.pdf

¹² Haley, T. R. (2008). The Lab of the Future: Building Facilities that Attract Premier Faculty and Students. *Facilities Manager*, 24(1), 30-31.

Goals:

Montana Tech will have several highly successful mission-focused **research focused** degree programs.

Where we are now... Currently, Montana Tech has 11 MS degrees, 3 graduate certificate programs, and 1 PhD degree.

Where we are headed...

- Every major research program will have both an MS and PhD option.
- Montana Tech will offer 4 PhD programs. We will pursue PhD collaborations within the MUS and outside the MUS. We offer the newly enacted PhD in Materials Sciences as a successful model for constructing PhD programs at Tech and within the MUS.

Montana Tech will have a number of high quality **professional graduate degrees**.

Where we are now... We currently offer professional Master degrees in industrial hygiene, project management, and technical communications.

Where we are headed... We envision offering several additional mission-focused non-research graduate degrees, including several in engineering. Many of these programs will be delivered online to capture students across the nation and world.

Montana Tech will create a culture that **values and rewards research**.

Where we are now... Today, the faculty culture primarily values undergraduate education. Montana Tech has a few incentive programs for research. New faculty are eligible to apply for seed grants. These grants of up to \$5,000 are intended to support new faculty members establishing research labs. Established research active faculty receive a standard one course per semester reduction in teaching. Faculty members with grants are eligible to buy out additional courses as well. Faculty members in graduate degree granting departments receive no additional workload reductions in recognition of their work with graduate students.

Where we are headed...

- Montana Tech will create programmatic structures to support new faculty researchers. These supports could include reduced teaching loads during the first year, startup funds, and/or mentoring programs.
- Montana Tech will investigate workload policies that recognize and reward faculty for working with graduate students and conducting research; especially funded research.
- Tenure and promotion standards, especially those for departments that grant graduate degrees, will be modified to clearly reflect a research expectation based upon national standards for the discipline.

Montana Tech will create **research centers** to enable collaborations and institutionalize funding opportunities.

Where we are now... Today, Montana Tech has only one active center (CAMP) that is recognized by the Board of Regents¹³. Research centers are shown to increase faculty productivity and to support cross-discipline and inter-institutional collaborations¹⁴.

Where we are headed... We will create at least three additional research center in areas like Underground Mining Education Center, geosciences, petro-sciences, and electric energy delivery. Each center will have a full-time director that will develop collaborations between Montana Tech faculty members and outside entities. Directors will also help seek funding to support the research conducted by the center.

Montana Tech will invest in **laboratory facilities** needed to sustain high profile research areas and PhD programs.

Where we are now... Montana Tech has outstanding and unique teaching laboratories; but, only pockets of nationally competitive research labs. For example, Montana Tech's Underground Mining Education Center (UMEC) is the only on-campus underground mine in the world dedicated to teaching.

*Where we are headed...*A component of establishing research centers will focus on research lab development. We will build on recent research investments at Tech including the underground mine, Tech's first cleanroom, and a new scanning electron microscope. We will work to expand our petro-sciences, geosciences, and power systems labs to have state-of-the-art research components.

- Develop financial models that allow us to use IDC's in the development and operation of state-of-the-art laboratories
- Develop and strengthen collaborations with National Laboratories to increase Montana Tech's competitiveness in winning research grants and placing Tech graduates in important technical fields
- Develop research collaborations within the state and the region to leverage unique capabilities to solve problems important to Montana and the regions
- Develop research collaborations with Top Tier research universities to form mutually beneficial alliances.

¹³ <http://mus.edu/borpol/bor200/218-5.pdf>

¹⁴ Ponomariov, B. L., & Boardman, P. C. (2010). Influencing scientists' collaboration and productivity patterns through new institutions: University research centers and scientific and technical human capital. *Research Policy*, 39(5), 613-624.

Recommendation III:

Our approach to curriculum will focus on integrated problem solving

Montana Tech’s curricula and student experience will integrate team-based interdisciplinary inquiry, focused on solving problems through science, engineering, and technology. These experiences provide the creativity, knowledge, and skills that our employers desire, alumni cherish, and the state needs, and present students with opportunities to develop communication, critical thinking, cultural awareness, personal responsibility, business acumen, and other types of non-technical skills. The goal of integrating team-based interdisciplinary problems is “to ensure that students are given opportunities to tackle complex questions at every step of the way, from first to final year.”¹⁵ The American Society for Engineering Education recommends that undergraduate curriculum include a few key components. These components include team-based design projects in the first year of college, having a focus on real-world impact, and exposure to industry.¹⁶ Many of the practices in the report are shown to impact retention in STEM disciplines and/or later satisfactions.

At heart, all these high-impact educational practices seek to involve students in authentic learning experiences that favor open-ended problems like those encountered in the real-world. Courses that focus on practical problems create increased persistence in STEM disciplines.¹⁷ Extra-curricular opportunities like internships and undergraduate research can retain students by helping them to develop a professional identity.¹⁸ Even physical spaces, like makerspaces, that encourage experimentation and creativity can engage students in authentic learning.¹⁹

Montana Tech has strong experience in many of these educational practices. Many of our capstone courses include projects derived from industry, government, or the community. We offer students many different co-curricular opportunities to participate in authentic learning experiences. These include participation in undergraduate research, co-ops and/or internships; professional competitions like the “Waste-management Education Research Consortium International Design Team Competition”; and service organizations like “Engineers without borders”.

Goals:

Capstone/senior-design projects will be sponsored to engage students in addressing real-world, contemporary challenges

Where we are now... Many programs require capstone experiences that focus on solutions to real-world problems. These challenges are posed by external sponsors like the Forest Service; the Department of Energy; the Natural Heritage Program; Department of Defense; Montana

¹⁵ <https://www.insidehighered.com/news/2018/01/29/colleges-share-how-they-made-their-general-education-programs-more-laundry-list>

¹⁶ <https://www.asee.org/documents/publications/reports/2017TUEEPhase2.pdf>

¹⁷ https://innovation.ed.gov/files/2016/09/AIR-STEM2026_Report_2016.pdf

¹⁸ Eagan, M.K. (2013). *Understanding undergraduate interventions in STEM: Insights from a national study*. Presented to the Committee on Barriers and Opportunities in Completing 2-Year and 4-Year STEM Degrees, National Academy of Sciences, Washington, DC. Available:

http://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_085900.pdf [July 2015].

¹⁹ Mekolichick, J., & Wirgau, J. (2017). Leveraging the Maker Movement for Undergraduate Research: Developing a Making and Innovation Culture. *Council on Undergraduate Research Quarterly*, 37(4).

Resources; NUCOR Steel; Butte Silver Bow County; Fish, Wildlife, and Parks; Marathon Oil; ConocoPhillips; the Bureau of Land Management; DNRC; Montana Watershed Authorities; the NIH; and the NSF.

Where we are headed... 100% of capstone/senior-design projects will be sponsored. When possible, graduate students will help to mentor these projects.

Students will engage in **interdisciplinary team-based inquiry** beginning their first year

Where we are now... Some programs involve partnerships between departments such as Electrical, Mechanical, and Software Engineering's "Capstone Partnership Program;" Mining and Geological Engineering's "Mine/Geological Design Project;" and Civil Engineering's partnership program with Environmental Engineering, S.H.I.H., and Montana Bureau of Mines and Geology (MBMG). Montana Tech provides some problem-solving curriculum through first-year seminars in the majority of four-year degree programs. This is evident through specific seminars in programs like First-Year Engineering. We have very few interdisciplinary general education courses.

Where we are headed... 100% of students have at least one interdisciplinary experience in their first year.

Our campus will provide spaces where students, faculty, staff, and the community can engage in **collaborative problem-solving**.

Where we are now... We have several unique inquiry spaces on campus such as our Underground Mine Education Center and Natural Resource Research Center (NRCC).

Where we are headed... Infrastructure decisions will be made to provide collaborative spaces for students, faculty, and staff. These spaces will, along with technology and programming, will facilitate these collaborations for academic, research, and community endeavors.

Our students gain applied knowledge and skills through **research and internship/co-op experiences**

Where we are now... Not all students participate in internships or research experiences. In the 16/17 fiscal year, only 231 students reported 244 degree-related internship experiences. Whereas a larger number of students have paid research experiences through grants, MBMG, and CAMP, only 35 students participated in SURF or URP projects in 16/17. At Montana Tech's Techxpo event, students presented research or engineering solutions through 95 projects in 2015, 100 projects in 2016, and 124 projects in 2017.

Where we are headed...

- Every student will complete an internship or research experience through Undergraduate Research.
- Every student will present their research by participating in at least one professional conference, expo, and/or publication.

Recommendation IV:

Montana Tech will grow the STEM workforce in Montana and beyond

While four-year degrees remain an important qualification for workers in STEM, two-year and workforce education play a strong role in STEM education as well. There are a number of different fields where two-year degrees provide needed skills for entry into the STEM workforce.²⁰ Approximately 29% of the jobs in STEM fields (including health care) do not require a four-year degree.²¹ Community Colleges, with their legacy of workforce education programs, are playing an important role in building a STEM workforce capable of meeting national needs.²² Montana Tech has many two-year and certificate programs in STEM fields including Welding, Radiological Technician, Network Technology, Metals Fabrication, Automotive Technology, and the Pre-apprenticeship Line Program. We recognize the important role of two-year education in supporting the development of a strong STEM workforce.

Montana Tech recognizes our unique capacity to remove some of the typical barriers for students that wish to begin a four-year degree after completion of a two-year degree. There are not separate general education courses for two-year and four-year students. This means that two-year and four-year students take the same science, math, communications, social science, and humanities courses. This eliminates two barriers often seen by transfer students: the differences in expectations present at different institutions and the difficulty transferring courses between institutions.²³

Changing enrollment patterns have created "... a complex set of student pathways for obtaining an undergraduate credential."²⁴ These complex pathways mean that students, especially those in two-year and certificate programs, are struggling to graduate on time.²⁵ Colleges across the US are helping to ensure timely-graduation via structured scheduling²⁶ and degree pathways²⁷ that help students move more seamlessly between related programs.

The physical space and organizational structure of the institution will **remove barriers** for timely completion of degrees.

Where we are now... Currently all of Montana Tech's two-year programs are part of Highlands College and are housed at a separate facility. The facility is located ten miles south of the main campus. The Highlands college facility has no space for wet labs. Consequently, students that are part of a two-year or certificate program must travel to the main campus to take courses in

²⁰ <https://blog.dol.gov/2016/07/28/get-a-stem-job-with-less-than-a-4-year-degree>

²¹ <http://lmi.mt.gov/Portals/193/Publications/LMI-Pubs/Articles/2016/1016-STEMjobs.pdf>

²² National Academies of Sciences, Engineering, and Medicine. (2016). *Developing a national STEM workforce strategy: A workshop summary*. National Academies Press.

²³ Townsend, B. K. (2008). "Feeling like a freshman again": The transfer student transition. *New Directions for Higher Education*, 2008(144), 69-77.

²⁴ National Academies of Sciences, Engineering, and Medicine. (2016). *Barriers and opportunities for 2-year and 4-year stem degrees: systemic change to support students' diverse pathways*. National Academies Press.

²⁵ Complete College America. (2014). *Four-Year Myth: Make College More Affordable, Restore the Promise of Graduating on Time*. Indianapolis, IN: Complete College America.

²⁶ <https://ccrc.tc.columbia.edu/media/k2/attachments/building-guided-pathways-community-college-student-success.pdf>

²⁷ <https://ccrc.tc.columbia.edu/media/k2/attachments/guided-pathways-part-3-timeline-tips.pdf>

Biology, Physics, and Chemistry. In addition, our current schedule is not structured to facilitate student travel between the two campuses. The combination of the physical separation with the scheduling means that students have barriers to completing their degree programs in a timely fashion. Our current organization structure means that related two-year programs and four-year programs often have separate department heads and are supervised by different deans. There means that there is often very little alignment between the requirements for related two- and four-year degrees. Students who wish to change from a two-year to a four-year program or from a four-year to a two-year program often need to take extra courses to satisfy degree requirements. This factor also impedes timely degree completion.

Where we are headed...

- Related two- and four-year programs will be more closely aligned to facilitate timely degree completion.
- Programs will be reorganized within and between colleges to create stronger pathways for students transitioning between two- and four-year programs.
- Scheduling and physical space use will be intentional and ensure that students in all degree programs can complete their courses on time.

Montana Tech will ensure that Montana students continue to have access to an **affordable education**.

*Where we are now...*In 2017, the Montana Tech Foundation launched the “Be the First” Initiative.²⁸

This Initiative supports first-generation college students with financial need that live in the Butte area. In 2018, Montana Tech awarded ___ in scholarships. Only ___ were awarded to students in two-year degree program. There are very few institutional scholarships that two-year students are qualified to receive. Students that move into a four-year program from a two-year program have an additional barrier when applying for continuing student scholarships. Currently all courses taken while the student was enrolled in a two-year program are treated as transfer courses and do not count towards the student’s GPA. This means that students in these programs are not able to meet the GPA requirement for continuing student scholarships.

Where we are headed...

- All Montana Tech students will have a single transcript.
- The Montana Tech Foundation will continue to seek donations for scholarships that help Montana students in all degree programs afford an education.
- A tuition structure will be created that will maintain affordability for Montana students while still supporting a world-class education.

²⁸ https://mtstandard.com/news/local/new-initiative-grants-full-scholarships-to-montana-tech-to-local/article_85dbdb30-12b1-551f-87a4-003d2e07a421.html

Proposed Timeline

By the end of FY 2019 –

- Work with faculty and students to develop a student Honor Code
- Create an Office of Faculty and Staff Development and Instructional Design: This office will support the analysis of general education program, development of interdisciplinary coursework, and design assessments that measure both technical and soft skills.
- Reorganize the management structure of the institution to encourage both instructional and research collaboration and facilitate pathways for students from Associate to Bachelor degrees
- Create a unified transcript for all work done by students while at Montana Tech.
- Create a tuition structure that supports a world-class education while also maintaining affordability for Montana students.

Within 1 year –

- The reporting line of the Chancellor will be at the Commissioner level and the title changed to President: Tenure and promotion applications, employment approvals, and funding approvals will be routed directly to the Commissioner for OCHE and/or for consideration by the Regents
- Launch Master of Engineering degree
- Launch MS in Materials Science and Engineering degree
- Pilot interdisciplinary problem-based courses for first year students
- Incorporate either research or internship experiences in four-year programs that don't already have them and establish student outcomes across programs for these experiences
- Hire an independent consultant to create a space plan and space approval process: This physical reorganization will support creation and allocation of spaces for both teaching and research
- Review results from Program Prioritization and begin analyzing the organizational and management structure

Within 5 years -

- Implement student honor code
- Integrate discipline specific code of ethics into curriculum
- Office of Faculty and Staff Development and Instructional design begins offering instructional design workshops
- PhD in Material Science expanded to PhD in Materials Science Engineering
- Creation of two additional PhD programs
- Master of Engineering program in operation with 2-3 options/concentrations highly enrolled (at least 20 FTE)
- Two additional research centers are operational
- Create an accessible portal (web and physical) that identifies and curates capstone challenges, cultivates monetary sponsors and liaisons with clients, industry executives, and granting agencies
- Revise the workload policies for faculty: This revision should incorporate supervision of graduate students and teaching interdisciplinary first-year or senior design courses

- All programs incorporate a team-based problem-solving course in their first-year curricula and in their senior capstone
- Review/revise the General Education program
- Work to streamline curricula in related disciplines in order to facilitate transitions between two- and four-year degree programs

Within 10 years –

- Four total PhD programs operational
- Four research centers operational
- \$20 million in sponsored program funding annually received