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Special thanks to the following offices as sources of information:

- College of Arts, Sciences, and Business
- College of Engineering and Computing
- Enrollment Management
- Graduate Studies
- Student Affairs
- Academic Support
Introduction

The Student Success Committee serves as an advisory committee appointed by the Chancellor to address key issues related to improving student retention and student academic success. During the 2018-2019 academic year, the Student Success Committee met every other week under the direction of two chairs: the Vice Provost for Academic Support and the acting Vice Provost and Dean for Enrollment Management. This report includes a summary of the primary issues addressed by the Student Success Committee, as reflected in the 2018-2019 meeting minutes.

Committee Background and Charge

The Student Success Committee is charged with investigating and recommending to the Provost and the Chancellor specific programs, processes, and services that will serve and support all Missouri S&T students in achieving their educational, professional, and personal life goals.

In completing these tasks the Student Success Committee will:

1. Focus on undergraduate and graduate student success within the context of the mission and vision of Missouri S&T. The committee will emphasize in its work the S&T values of life-long success, creativity, integrity, sustainability, partnerships, and inclusion.

2. Take into account the diverse nature of the students we serve at Missouri S&T, the diverse nature of the majors and minor programs we offer, and the increasingly complex blend of modalities in communications and delivery that are used in instruction, advising and research.

3. Investigate best practices in serving a broad profile of students ranging from traditional students (18 to 24 years of age), to adult/older students, transfer students, and diverse populations that may include underrepresented minorities, international students, first-generation students, low-income students, veterans, full- and part-time students, etc.

4. Keep the university community informed through publication of an annual report.

5. Research best practices in supporting all students so that they persist to graduation such as the following:

   - Best practices in student transitions from high school or from another higher educational institution to a university including, but not limited to, summer bridge programs, incoming freshmen placement exam policies, advising, residential life policies and programming, learning/living communities, freshmen and sophomore seminars, honors programs, freshmen or university-wide common reading projects, peer mentoring, at-risk student monitoring (i.e. student success mentoring), etc.
• Best practices aimed at increasing retention of both new and returning students including, but not limited to, intrusive advising, early warning systems, academic mapping and planning tools, financial aid policies, etc.

The student success committee members are appointed by the Chancellor and will typically include a broad range of representation including faculty, staff, and students from a wide range of offices and disciplines at Missouri S&T.

The Student Success Committee meets every other week (during the academic year) to discuss issues related to improving student retention and student academic success, and to implement new programs and processes that impact student retention. In November, the Student Success Committee presents its findings and recommendations to the Chancellor. A copy of the annual report is available on the Academic Support website and upon request.
Executive Summary

Accomplishments from the November 2018 Recommendations

- Revise language in our admittance letter for first year students.
- Develop a website detailing entrance requirements for all majors.
- Establish a central advising center.
- A campus-level communication plan to address Graduate Research Assistant and Teaching Assistant duties.
- Conduct focus groups in an attempt to get feedback and gather qualitative data to begin measuring the climate, social integration on campus, sense of belonging, and academic success among URM students.

Recommendations by the Student Success Committee in November 2019

- Continue focus groups of URM students.
- Provide more resources to transfer students to help ensure their academic success and retention.
- Explore the preparedness of our transfer students and how we might improve the quality of the incoming student.
- Finalize the Discussion Guide for Graduate Students and Advisors and shared it with graduate students and faculty advisors.
- Develop a Graduate Student Success Guide with involvement by Global, Graduate Studies, International Affairs, and the Colleges.
- Create a Graduate Student Resource Center.
- Revisit retention and time-to-degree, perhaps with the assistance of an upper-level statistics or engineering management course.
- Explore different funding/enrollment models to ensure student financial support and a healthy work/life balance.
- Launch a feasibility study/benchmarking to determine what comparator schools are doing and what benefits and obstacles are involved in various models.
- Add an International Affairs staff member to the Student Success Committee and the Graduate Student Experience subcommittee

The Student Success Committee reviewed the following documents

Appendix A
- Cumulative Retention & Graduation Rates of First-Time, Full-Time Degree Seeking Freshmen.

Appendix B
- Retention Strategies & Tactics.
Appendix C

- Enrollment Management: Calculus Location Analysis
- 4th Week Enrollment Talking Points
2018-2019 Student Success Committee Members

Co-Chairs:
Dr. Jeff Cawfield, Vice Provost for Academic Support
Brooke Durbin, Acting Vice Provost and Dean for Enrollment Management

Committee Members:
Bridgette Betz, Director, Student Financial Assistance
Christina Carrig, Student Council Representative
Tyrone Davidson, Co-Director, Advising Center
Dr. Patty Fleck, Director, Counseling Services
John Gallagher, Director, Student Life
Dr. Shannon Fogg, Interim Dean, College of Arts, Sciences, and Business
John Gallagher, Director, Student Life
Dr. Eddie Grover-Bisker, Vice Chancellor of Student Affairs
Deanne Jackson, Registrar, Registrar's Office
Kayla Klossner-Thompson, Director, New Student Programs
Quentin Lee, Undergraduate Student Representative
Dr. Doug Ludlow, Co-Director, Advising Center
Rachel Morris, Assistant Vice Provost, Student Support
Dr. John Myers, Associate Dean, College of Engineering and Computing
Julia Morgan, Graduate Student Representative
Adrienne Neckermann, Assistant to the Vice Provost, Graduate Studies
Dorie Paine, Director, Residential Life
Dr. Stephen Raper, Associate Professor, Engineering Management & Systems Engineering
Dr. Dan Reardon, Assistant Professor, English and Technical Communications
Anitra Rivera, Director, Student Diversity Initiatives
Paul Runnion (Lecturer), Mathematics
Cathy Tipton, Interim Director, Admissions
Dr. Dave Westenberg, Associate Professor, Biological Sciences
Dr. Klaus Woelk, Associate Chair, Chemistry
William Zwikelmaier, Director, COER

Ex Officio
Joni Burch, Associate Director, Residential Life
Dr. Kate Drowne, Ph.D., Interim Vice Provost and Dean, College of Arts, Sciences, and Business
Erica Long, Senior Academic Advisor, Mechanical & Aerospace Engineering
Donna Luechtefeld, Executive Assistant, Enrollment Management
Dr. Caprice Moore, Interim Vice Provost for Global Learning
Dr. Stephen Roberts, Interim Provost
Katie Tucker, Degree Completion Advisor, Registrar
Dr. Costas Tsatsouli, Vice Chancellor for Research and Dean of Graduate Studies
Dr. Richard Wlezien, Vice Provost and Dean, College of Engineering and Computing
Current Status of Missouri S&T Retention

In 2008, Missouri S&T achieved a record high first to second year retention rate of 88%. Since 2008 the figure has fluctuated irregularly between 81% and 87% (over the last 5 years, the median first to second year retention rate is 83%). For the fall 2017 cohort, the first year retention rate was 83%; this is 2% above the rate for the fall 2016 cohort. The current Missouri S&T strategic plan goal is to achieve a first to second year retention of 85% by 2023.
As the Student Success Committee moves forward with its charge, the measurement of the committee’s achievement of success will be this metric.

A full report of Cumulative Retention & Graduation Rates of First-Time, Full-Time Degree Seeking Freshman, is included as Appendix A of this report. A complete list of Retention Strategies and Tactics is included as Appendix B.
Key Issues Addressed by the Committee

In 2018-2019, the Student Success Committee focused on four priority goals deemed critical to retention issues. The committee organized itself into four subcommittees to coordinate the implementation of recommended actions. Action items were pursued as tactical planning items where practical.

Subcommittee #1: Under Represented Minority Students
Members: Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Patti Fleck, Rachel Morris (chair), Adrienne Neckermann

Subcommittee #2: Transfer Student Experience
Members: Erica Long (chair), Anitra Rivera, Katie Tucker, Dave Westenberg, Klaus Woelk

Subcommittee #3: Graduate Student Experience
Members: Patti Fleck, John Gallagher, Deanne Jackson, Adrienne Neckermann (chair), Caprice Moore, John Myers

Subcommittee #4: Time to Degree/Credit Hours to Graduation
Members: Bridgette Betz, Caprice Moore, John Myers, Steve Raper (chair), Dan Reardon, Will Zwikelmaier
Subcommittee #1: Under Represented Minority Students

Charge
This subcommittee was established to work with underrepresented minority students to identify barriers and challenges to student success at Missouri S&T.

Summary
A survey was sent to 574 students identified at underrepresented minorities on campus in the spring 2019 semester. Of the 574 students, 41 students responded to the survey. Of the 41 students, 16 were interested in being in a focus group for fall semester 2019. Three of those 16 students attended the first focus group meeting on August 22, 2019.

8-22-19 focus group discussion
How did you hear about Missouri S&T?
- From Moberly, MO. Attended a summer camp
- From Rolla. Cheapest option with scholarships and assistance
- From Houston TX. Brother played football here and had a good experience.

One student found internships through NSBE. The companies he worked for do not come to Missouri S&T’s career fair (Whirlpool, American Express)

Engineering Management student found internship by attending the Night to Network event before the career fair. Said it is hard for an Engineering Management major to acquire internships via career fair.

Where did you learn about available campus resources to help you?
- LEAD sessions posted in syllabus
- Writing Center was required by FE program
- Classmates using the app “GROUPME”
- OWeek mentor continued to be a resource after opening week
- Library where students were studying
- Word of mouth

Note: We asked and it was suggested that a central location/table of resources would be helpful at the library. Another possibility would be minerbytes.

Concerns:
- None of the 3 had personally experience stereotyping on campus but have had friends who have experienced it. Said the African American students are underestimated in their academic abilities. They are given “easier” parts of projects and their input is not valued. They feel they have to prove themselves.
- Sexual assault in organizations. Incidents being reported but not sure if it is taken care of. Several orgs have several incidents.
- Do not want the +/- system to be implemented
- One faculty compiles all notes for class in an eBook and requires the students to purchase.
- Would like to see all faculty have to post grades to canvas-require.
- Midterm grades made available.
• Lack of structure/organization of faculty
• Multiple choice exams not helpful (statics, mechanics of materials). Many students have to retake course.
• Financial struggles: both academic and day to day financial.
• Feel instructors care more about research than students/classes.
• Would like to see more rewarding for student’s academic success (i.e. finishline scholarship)

How do students feel about counseling services?
• Nothing negative.
• More diverse staff would be helpful.
• Don’t hear enough about services.

Advice for freshmen
• Speak to upper classmen
• Take as many classes off campus (i.e. math/physics)-“weed out” classes
• Read emails

Ideas:
More social activities for students (i.e. pep rally type events)
Provide food for all students as they are walking to class (i.e. breakfast burrito handouts)
When promoting events, use google calendar instead of emails. Students can accept the invite and it goes to their calendar and they receive reminders via text.
Use videos when promoting events.
The students liked the idea of continuing the focus group throughout the year and agreed to promote the focus group to their friends.

Recommendations
The subcommittee is working to establish a productive working focus group as the students were receptive to the idea of meeting throughout the year. Those meetings will give the subcommittee more understanding of challenges students face as well as ideas to implement change to assist with those challenges.
Subcommittee #2: Transfer Student Experience

Charge
This subcommittee was established to examine the academic success of Missouri S&T transfer students as it relates to probation, deficiency, and withdrawals on campus.

Summary
Primary concerns arose from data presented by the department of mechanical and aerospace engineering, showing a significant difference in the rate at which transfer students were placed on probation or deficiency when compared to non-transfer (native) students within that department. The decision was made to explore this data at the campus and college levels.

Analysis and Research
The committee began its work by requesting enrollment data for the campus, broken down by transfer and non-transfer students as well as the same information for students who had been placed on probation or deficiency during the most recent four terms. Data was also collected from the registrar office for students who had withdrawn from all courses via our retention specialist (Note – this does not include students who simply did not return to campus).

While it was not analyzed for this report cycle, also included in the data were the students’ specific major, academic level, age, gender, and race.

Total Campus Data for Probation and Deficiencies
In three of the four semesters analyzed, a greater percentage of Missouri S&T transfer students were placed on scholastic probation compared to non-transfer students. These differences are consistent though they may not be significant. However, over this time period, both non-TRE and TRE students show a similar percentage of students on deficiency.

Probation and Deficiencies by College
Differences among transfer students and non-transfer students were similar when compared at the College level. For the College of Engineering and Computing, a comparable percentage of transfer students were placed on scholastic probation as non-transfer students with the exception of the two most recent semesters. In those semesters, the percentage of TRE students on probation was as much as 1.42 percentage points higher than non-TRE students. A similar trend is seen for CEC students placed on deficiency with similar percentages in two semesters but differences as great as 0.62 percentage points.
In the College of Arts, Sciences, and Business, transfer students were placed on scholastic probation as much as 2.31 percentage points higher than non-transfer students in three out of four semesters. In addition, deficiencies among TRE students were as much as 1.5 percentage points greater than among non-TRE students in two of four terms.

Overall, the two-year average percentage of deficiencies for transfer and non-transfer students does not appear to be significant, with the only difference being 0.5 percentage points greater deficiencies for CASB transfer students. The two-year average percentage of probationary status for both colleges is higher for transfer students, but the significance of a 0.6 percentage point difference is yet to be determined.

Withdrawals from all Courses
While the percentage of student withdrawals from courses may seem low, transfer students do so at nearly twice the rate of non-transfer students. This is a difference the committee believes should be explored further.
**Recommendations**

The undergraduate student population at Missouri S&T is comprised of approximately 20% transfer students, yet they represent 30% of the students who have withdrawn from all classes in the past four terms. These students as a group underperform, sometimes significantly, when compared to non-transfer students. The committee believes that we, as a campus, could provide more resources to transfer students to help ensure their academic success and retention. Additionally, it could be beneficial to explore the preparedness of our transfer students and how we might improve the quality of the incoming student.
Subcommittee #3: Graduate Student Experience

Charge
The subcommittee was established to examine how to improve graduate student experience at Missouri S&T. This is the fourth year of this subcommittee. The subcommittee charge for 2019 is as follows:

- Examine quality of life issues (funding, housing, community, etc.) affecting graduate students.
- Examine the academic experiences of graduate students.
- Explore how non-academic resources are provided to graduate students.
- Make recommendations to improve graduate student experience.

Summary
The Graduate Student Experience Subcommittee started in 2015 to address student success issues at the graduate level. The first year, the subcommittee initiated its first Graduate Student Experience Survey to gauge student satisfaction with Missouri University of Science and Technology, including admission processes, funding, working conditions, developmental opportunities, and other relevant topics. The committee planned to re-survey every three years. In 2016, the subcommittee conducted its first graduate student focus group, which provided an in-depth look at the educational experiences of graduate students. This first focus group was comprised solely of graduate students from the College of Engineering and Computing (not by design, simply by chance). In 2017, the subcommittee conducted a second focus group with graduate students from the College of Arts, Sciences, and Business. Also in 2017, the subcommittee assessed time-to-degree for doctoral students. In 2018, the subcommittee re-administered the Graduate Student Experience Survey and conducted a focus group for distance graduate students.

In 2019, the Graduate Student Experience Subcommittee had several new members, so the first part of the year included bringing new members up to speed on the previous subcommittees’ work, including reviewing survey responses, focus group details, etc. This also provided an opportunity for the subcommittee to reevaluate their charge and determine which next steps were necessary. As a result of several discussions, the subcommittee:

1. Revisited data regarding retention and time-to-degree for graduate students. The data available is very poor and the lack of firm, clear data makes obtaining baselines and tracking students hard.
   a. The subcommittee would suggest, as a starting point, to consider students with no change of program or lapse in attendance (i.e. a student who starts as a master’s student and does not add a certificate or switch to a doctoral program).
   b. Consider tasking an engineering management or statistics course with normalizing the data and looking more closely at time-to-degree and retention.
2. Reviewed a report provided by the Registrar’s Office that includes contacting students who have not returned for a second semester and asking what barriers might prevent their return. Unofficial report indicated students did not register because:
a. Holds (advising, cashier’s, grad studies, etc.)
b. Forgot
c. Intentionally waiting/still planning to enroll
d. Personal reasons (family, job conflicts, etc.)

3. Created a Discussion Guide for Graduate Students and Advisors
   a. The intent of this document is to encourage faculty advisors and graduate student advisees to clarify general expectations of an advisor/advisee relationship, including deadlines, expected output, number of papers, expected degree progress, work/life balance, funding, etc.
   b. This would not replace face-to-face interaction or advising meetings, but would supplement communication, clarify expectations, and provide a reference point for the student and advisor throughout the student’s career at Missouri S&T.

4. Suggests creation of a Graduate Student “Success Guide”
   a. This document would help graduate students navigate their career at Missouri S&T and to answer frequently asked questions not listed in the Graduate Catalog and are not obvious to students on how to navigate. Examples would include:
      i. What happens if my research funding runs out?
      ii. How do I change advisors?
      iii. What do I do if my advisor leaves the university?
      iv. Can I participate in an internship/co-op/study abroad semester?
      v. Can I take distance courses if I am an on-campus student?
      vi. How do I change from thesis to non-thesis (and vice-versa)?
      vii. How do I handle a grievance?
      viii. What if I am on a GRA but want to gain teaching experience?
      ix. How do I get involved in a graduate student support group?
   b. This document would be a collaborative effort among the Office of Graduate Studies, Global, International Affairs, and the Colleges.
   c. This document could include links to important campus resources such as Equity & Title IX, Student Involvement, Career Opportunities & Employer Relations, Counseling Services, Wellness, etc.
   d. A limited selection of frequently asked questions are available on each office’s webpage. This would be an opportunity to collaborate and create an encompassing document so that graduate students have access to all of this information in a searchable, sortable document.

5. Suggests creation of a Graduate Student Resource Center
   a. A Graduate Student Resource Center would be a place for graduate students to access resources, participate in social and networking events, attend graduate-specific workshops, and present defenses. This space could spur collaborative and inter-disciplinary work and subsequently increase creativity and research.

Recommendations
1. Finalize the Discussion Guide for Graduate Students and Advisors and shared it with graduate students and faculty advisors.
   a. Sent to graduate students from the Office of Graduate Studies each semester
b. Sent to faculty from the College Deans each semester
c. Included as a checklist item in Starfish/S&T Connect
d. Included with CAFÉ resources

2. Develop a Graduate Student Success Guide with involvement by Global, Graduate Studies, International Affairs, and the Colleges.

3. Create a Graduate Student Resource Center.

4. Revisit retention and time-to-degree, perhaps with the assistance of an upper-level statistics or engineering management course.

5. Next year:
   a. Explore different funding/enrollment models to ensure student financial support and a healthy work/life balance. Launch a feasibility study/benchmarking to determine what comparator schools are doing and what benefits and obstacles are involved in various models.
   a. Add an International Affairs staff member to the Student Success Committee and the Graduate Student Experience subcommittee
Subcommittee #4: Time to Degree/Credit Hours to Graduation

Charge
Given the increased scrutiny of 4 year and 6 year graduation rates, this subcommittee basically evaluated a more extensive data set (8 years versus 5) that was first conducted in 2015-2016, and 2016 - 2017. In the latter study, four separate required degree hours categories were used: 120 credit hour programs (BS and BA), 126 credit hour program (Technical Communications), 128 credits hours BS programs, and programs that included primary or secondary education that would be well over 128 credit hours. Data sets for each category included First Time College Students (FTC) and Transfer (TRE) Students. In addition, a deep inspection of degree audits for the Engineering Management May 2019 graduating class was conducted, as well as responses to written questions. A small number of CASB program students responded to a range of questions and the May 2019 Computer Science graduates provided written responses to the same set of questions. Additional insights are provided from a report of the CEC Academic Affairs Committee with regard to courses in programs with identified high rates of F or D grades and Withdraws. A small number of articles and research studies were reviewed to find successful programs or strategies to increase retention and graduation rates.

Summary

Original Motivation*
Average credit hours at graduation was discussed as an agenda item of the General Officers meeting on July 8, 2015. For the 2013-2014 graduating class, the average number of credit hours students graduate with at:

MU 134
UMKC 138
Missouri S&T 147
UMSL 141
System Average 137

Credit hour graduation requirements*
Bachelor of Arts (BA) and Bachelor of Science (BS) programs at Missouri S&T specify the required and elective courses and set the minimum number of credit hours required for each degree program. BA programs typically require a minimum of 120 credit hours but may be higher. Biology, Business and Management Systems, Chemistry, Economics, English, History, Information Science and Technology, Multidisciplinary Studies, and Philosophy require a minimum of 120 credit hours. Programs that offer the secondary education emphasis require additional hours ranging from 124-135 credit hours. Technical Communications requires a minimum of 126 credit hours. BS programs typically require a minimum of 128 credit hours. However, Geology and Geophysics requires a minimum of 127 credit hours. Mathematics requires a minimum of 128 credit hours, however the minimum increases to 135 credit hours with the secondary education emphasis. All engineering programs require a minimum of 128 credit hours with the exception of Chemical and Petroleum Engineering, which require 129 credit hours.
Reasons minimum credit hours for graduation requirements may be exceeded*
There are a wide variety of known reasons the minimum credit hours for graduation can be exceeded. These reasons cross the entire spectrum, positive, negative and neutral. Positive reasons, or those which might be considered “value-adding” from the student’s perspective include obtaining minors, dual majors or second BA/BS degrees. There are two examples that could be considered negative that are actually a very positive outcome. The first is that students change their majors. This means that they are persisting with the university but will subsequently have more credit hours. The second example concerns students that start in a lower math course. Because they are in the lower math course they will have to take more math courses to be able to continue through their degree requirements. This may seem negative but in actuality these students have a deeper understanding of the math needed for the engineering degrees.
Some students may consider starting in a prerequisite mathematics class or a change of major as a negative due to attitude or perception. Those which might be considered more negative include failing courses or not passing with a required grade, and readmit students who needed to increase their GPA for readmission to the university or program. Neutral reasons may include transferring in courses taken during their high school years, through AP, Dual Enrollment, IB, or CLEP which will not apply to their chosen degree program, and ROTC credit obtained after enrollment. Transfer students may also transfer in credits which do not apply to their chosen program. However for purposes of this study, transfer or TRE students are evaluated separately.

Reason for graduating in more than four years
A wide variety of reasons may contribute to graduating in more than 4 years. Student behaviors which may include the following: Choose fewer hours per semester; Drop/WD quicker; Time Management (commitment to engaged learning versus other things); Accept one or more Co-op experiences; Working to pay the bills, including cost of education; Lack of funds (may not be a choice); One or more minors; Dual majors; Not in a hurry. Other reasons might include: Department or campus scheduling issues or capacity issues; Pass criteria of “x” or better; Capacity or choke point courses; Not passing key prerequisite courses; Initial math placement; Change of major; Excessive extracurricular involvement; Academic advising; Personal issues, and “Academic difficulties”.

Reasons for graduating in four years
The stated reasons for graduating in four years came from student responses from the Student Success Committee Student Panel, Engineering Management May 2019 graduates, a small number of CASB students and the May 2019 Computer Science Responses. Those responses include: Personal motivation (never crossed my mind to not do so, a known and expected construct); Family expectations (mom and dad will pay if in 4 years, general expectation); Costs less overall (additional living expenses, etc.); Leave with no debt; Get out and make money sooner; Good planning and ease of scheduling; and sadly – cannot stand Rolla. How this was accomplished includes bringing in credit from high school, summer classes, and classes while on co-op, and minimal academic difficulties

Data used for this analysis*
The Academic Technology Support Team of the Missouri S&T IT group generated several data sets for this analysis. The categories included, Technical Communications, programs which require 120 credit hours for graduation (BA), programs that require 128 or 129 credit hours for
graduation (BS), and programs that included secondary and elementary teacher certification (BA and BS). The data sets included students who graduated during the 2010-2011, through 2017-2018 academic years. The data was separated for FTC and TRE students and specific tabulated information was generated. Some additional data was generated for each academic year such as gender and ethnicity. However, no subdivisions using those categories was undertaken in this study. The major categories of data include the following:

• General
  o Total Number of Graduates, Average Credit Hours, Median Credit Hours, Avg. GPA, Time to Degree (TTD)
• Gender
  o Number of Male, Number of Female
• Ethnicity
  o URM and Non URM in various categories
• Graduated with 12X credit hours
  o Number, TTD, Median Credit Hours, Average Credit Hours
• Graduated with greater than 12X credit hours
  o Number, TTD, Median Credit Hours, Average Credit Hours
• Graduated with greater than 12X Credit Hours with minor(s)
  o Number, TTD, Median Credit Hours, Average Credit Hours
• Graduated with greater than 12X Credit Hours with dual major(s)
  o Number, TTD, Median Credit Hours, Average Credit Hours
• Graduated with greater than 12X Credit Hours and changed major(s)
  o Number, TTD, Median Credit Hours, Average Credit Hours
• Graduated with greater than 12X Credit Hours not in other group
  o Number, TTD, Median Credit Hours, Average Credit Hours

Data Statistics
Not all categories as shown above will be reported out as in past iterations.

Technical Communications

Technical Communications – FTC
Bachelor of Arts 120 credit hour program
N = 10, 4.9 years TTD, 136.9 credit hour average, 137.2 median credit hours overall
1 of 10 graduated in 4 years; 3 obtained minor(s) 1 dual major; 5 changed majors; one obtained a co-op and was the dual major

Technical Communications – TRE
Bachelor of Arts 120 credit hour program
N=20, 3.7 (4.0) TTD, 143.6 credit hour average, 143 median credit hours overall
4 obtained minor(s); 1 dual major; 5 change of majors

Teacher Certification Programs
Secondary, Elementary and Teaching Certification BS and BA students – FTC
Varied Graduation Credit Requirements
N=72, 5.2 TTD, 152.62 credit hour average, 147.59 median credit hours overall
34 obtained minor(s) (47.2%), 2 dual majors; 38 change of majors (52.8%); no co-ops

Secondary, Elementary and Teaching Certification BS and BA students - TRE
Varied Graduation Credit Requirements
N=33, 3.9 TTD, 155.5 credit hour average, 156.3 median credit hours overall
14 obtained minor(s) (42.4%), 0 dual majors, 5 change of majors (15%), no co-ops

Non-Engineering and Non-Education BS and BA Programs
Varied Graduation Requirements but the majority 120 credit hours – FTC
N=411, 4.95 TTD, 141 credit hour average, 139.3 median credit hours overall, 4.9% graduate with the minimum credit hours
239 obtained minor(s) (58.3%), 98 dual majors (23.8%), 223 change of majors (54.2%), 47 co-ops (11.4%)

Varied Graduation Requirements but the majority 120 credit hours – TRE
N=269, 3.3TTD, 184.35 credit hour average, 148.06 median credit hours overall
112 obtained minor(s) (41.6%), 84 dual majors (31.2%), 77 change of majors (28.6%), 6 co-ops (2.2%)

Math and Engineering BS Programs
BS 128 or 129 credit hour programs (majority 128 credit hours) – FTC
N=4874, 5.0 TTD, 146.6 credit hour average, 143.5 median credit hours overall, 5.7 % graduate with the minimum credit hours
1314 obtained minor(s) (26.9%), 537 dual majors (11%), 1534 change of majors (31.5%), 1099 co-ops (22.5%)

BS 128 or 129 credit hour programs (majority 128 credit hours) - TRE
N=2036, 3.4 TTD, 155 credit hour average, 152.6 median hours overall
319 obtained minor(s) (15.7%), 172 dual majors (8.4%), 204 change of majors (10%), 282 co-ops (13.8%)

Overall observations
Significant number of students engage in “value-added” opportunities such as minors, dual majors, and co-ops.
Observable differences between FTC and TRE students as should be expected.
These statistics indicate that Missouri S&T is a “5 year to degree” institution on average.
An extremely small number of students graduate with the minimum required credit hours.
This study more or less verifies the last study reported in 2016-2017.

Themes for Graduating in XX years – May 2019 Engineering Management Graduates
1. 4 years (N=11): Personal motivation (never crossed my mind not to graduate in four years); financial (mom and dad pay all if graduate in 4 years, leave with no debt, get out and make money sooner); International Student (5 year requirement, regrets not seeking co-op). Accomplished by bringing in Dual and AP, Summer courses, combination, and minimal academic difficulties. Prime driver seems to be personal motivation. Credit hours per semester varied, but if calculated, probably closer to 15/semester. 1 transfer student in the group (2/2), and one dual major, two with co-op. GPA: 3.582, 3.911, 3.080, 3.191, 3.429, 3.972, 3.697, 3.595, 3.199, 3.453, 3.440.

2. 5 years (N = 17): Key influencers appear to be academic difficulty (not passing a course(s)), placement in prerequisite math course(s). Additional influencers include co-op (8), dual majors (5). Most brought in Dual and AP courses. Maintaining grades and excessive extracurricular activities appear to be minimal contributors to the increased time to graduation. Most take less than 16 credit hours per semester with some making sure not to have a heavy load with known difficult courses. Summer courses at S&T and elsewhere were present (many to catch up with math and engineering courses). Working part-time or more is also a strong influencer. Some change of major present, but with the General Option, Emgt can absorb and include other engineering courses as a part of the degree. (This may be the group to try and understand and address more so than any other category)

3. 6 years (N=11): Very similar to 5 year category with key influencers being academic difficulty and placement in pre-math courses. A deeper look would likely indicate multiple academic difficulties (repeat, repeat same course). Two dual majors and 5 with co-op experience. Summer courses here or elsewhere. Some level of Dual or AP courses. Group includes two transfer students. One student had two co-ops. One student indicated taking lesser hours to maintain GPA. No serious indicators of too much extracurricular activities. Some decisions on course loads were due to anticipated difficulty level of courses.

4. 7+ years (N=8): Academic difficulties is the biggest issue which also led to breaks in studies in more than one case. Co-ops was present and change of major. Initial math placement had some impact but not as much as others. Dual and AP courses were present. Summer courses and transfer courses are present. Balance of schedules and the need to work were heavy influencers. Learning issues was also acknowledged in one case.

Excel Sheet – Emgt May 2019 – Appendix XX

Other Solicited Student Input
1 psychology graduate – 4 years (cost, expectations, family pressure)
4 history graduates – 3 in 4 years (cost, easy scheduling, 1 in 5 years (change of major)
3 biological science graduates – 2 in 4 years (good planning, summer classes), 1 in 5 years (transfer student and change of major)

Overall, course loads usually less than 16; extracurricular activities did not influence time to graduate; no noted structural barriers. Favorite quote of student who initially was a double major and could have graduated in 3 years, in response to taking less than 16 credit hours per semester: “It was the fact I couldn’t meet all my obligations, work, and pass my classes at the 17 I was averaging before that. Girls gotta eat, and to eat one must earn money to work.”

Computer Science graduates for Spring 2019 – 65 total:
24 or 36.9% graduate in four years or less, citing personal motivation, wanting to get out and earn money, and the cost if over four years, taking summer courses. One claimed a coop as well. 4 of those graduated in 3 or 3 and ½ years.
36 or 55.4% graduate in 4.5 (10) or 26 (5) years, citing academic difficulties, change of majors, minors and scheduling difficulties.
3 or 4% graduate in 6 years and 2 or 3% in 7 or more years. Reasons cited include dual majors, change of majors, study abroad, no job, academic difficulties, personal situation and work.

Overall, course loads (less than 16 were mentioned frequently, scheduling issues, need to work, minor, dual majors impacting time to graduate. Most indicated extracurricular had no impact. Grades (keep good grades) also seemed to occur multiple times.

CEC ACADEMIC Affairs Input
The CEC Academic Affairs Committee Study (available Fall 2019), is one part of efforts which identified courses in both CASB and CEC programs that may be barriers or impediments to graduation and which can increase the time to degree, particularly for students that are focused in the STEM fields. The following content has been extracted from the CEC Academic Affairs Report:

The following section reviews program by program courses and trends in DFW rates. In evaluating the DFW data from the Registrar’s Office at Missouri S&T, courses that have a combined letter grade of D + letter grade of F + Withdraws (DFW) at or above 15% were investigated. While there exists no specific national data on what is or what is not an acceptable DFW rate for students in engineering or STEM that the committee members were aware of 15% was selected as a level where DFW rates above 15% were considered concerning. It should be noted that at Missouri S&T, students may also drop a course prior to the sixth week of classes without it appearing on their transcripts. It is important to note that the DFW data analyzed does not include any drops and there is little ability to factor in the consideration of students that also drop a course which would certainly be a factor affecting a student’s time to graduation.

First Year Engineering Experience and Core Engineering Courses
Among the College of Engineering and Computing (CEC) courses that are required during the first two years for many engineering students in CEC programs, they include: FE 1100, CE 2200
and 2210 as well as Mechanical Engineering 1720 and 2350. Among this list of courses, data collected of the last five years indicates that the following courses have the highest DFW trends as shown in Table 1. FE 1100, CE 2200 and 2210, as well as ME 2360 exhibit the highest DFW rates among courses taught in CEC.

Table 1: Five Year DFW Trends among CEC Engineering and Computing Required Core Courses

<table>
<thead>
<tr>
<th>Subject and Course No.</th>
<th>Course Name</th>
<th>DFW Range [Low to High] (times &gt; 10% DFW rate)</th>
<th>Average DFW % over past 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mech Engr 1720</td>
<td>Intro to Engr Design**</td>
<td>0.8-3.3% (8 semesters)</td>
<td>2.4%</td>
</tr>
<tr>
<td>Mech Engr 2340</td>
<td>Statics and Dynamics**</td>
<td>0-9.8% (8 semesters)</td>
<td>4.4%</td>
</tr>
<tr>
<td>Mech Engr 2350</td>
<td>Engr Mechanics-Dynamics</td>
<td>12.8-27.3% (7 semesters)</td>
<td>14.8%</td>
</tr>
<tr>
<td>Mech Engr 2360</td>
<td>Dynamics</td>
<td>15.7-21.3% (5 semesters)</td>
<td>20.1%</td>
</tr>
<tr>
<td>FE 1100</td>
<td>Study &amp; Career in Engr</td>
<td>23.4-42.4% (4 semesters)</td>
<td>34.4%</td>
</tr>
<tr>
<td>CE 2200</td>
<td>Statics*</td>
<td>16.2-34.5% (10 semesters)</td>
<td>23.2%</td>
</tr>
<tr>
<td>CE 2210</td>
<td>Mechanics of Materials*</td>
<td>16.8-29.8% (10 semesters)</td>
<td>23.1%</td>
</tr>
</tbody>
</table>

* offered in Summer Semester 2015, 2016, 2017

** has not exceeded 10% in DFW

**First Year CASB KEY STEM Courses**
Among the College of Arts, Science and Business (CASB) courses that are required during the first two years for most engineering in CEC programs and STEM students in CASB, they include: Chemistry 1310, 1319, and 1320; Physics 1135, 2135; Math 1214, 1215, 2222, and 3304; Mechanical Engineering 1720 and 2350. Among this list of courses, data collected of the last five years indicates that the following courses have the highest DFW trends as shown in Table 2.

Table 2: Five Year DFW Trends among Key CASB STEM Core Courses

<table>
<thead>
<tr>
<th>Subject and Course No.</th>
<th>Course Name</th>
<th>DFW Range [Low to High] (times &gt; 10% DFW rate)</th>
<th>Average DFW % over past 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1310</td>
<td>General Chemistry I</td>
<td>25.7-49.0% (11 semesters)</td>
<td>35.4%</td>
</tr>
<tr>
<td>Chemistry 1319</td>
<td>General Chemistry Lab</td>
<td>12.7-30% (3 semesters)</td>
<td>8.2%</td>
</tr>
<tr>
<td>Chemistry 1320</td>
<td>General Chemistry II</td>
<td>15.4-54.5% (6 semesters)</td>
<td>12.9%</td>
</tr>
<tr>
<td>Math 1103</td>
<td>Fundamentals of Algebra</td>
<td>41.6-57.7% (8 semesters)</td>
<td>49.8%</td>
</tr>
<tr>
<td>Math 1120</td>
<td>College Algebra</td>
<td>50.4-57.7% (9 semesters)</td>
<td>47.2%</td>
</tr>
<tr>
<td>Math 1214</td>
<td>Calc For Engrs I*</td>
<td>17.0-37.0% (11 semesters)</td>
<td>26.2%</td>
</tr>
<tr>
<td>Math 1215</td>
<td>Calc For Engrs II*</td>
<td>15.9-37.6% (11 semesters)</td>
<td>31.9%</td>
</tr>
<tr>
<td>Math 2222</td>
<td>Calc with Analy Geom III*</td>
<td>11.9-27.4% (11 semesters)</td>
<td>19.6%</td>
</tr>
<tr>
<td>Math 3304</td>
<td>Elem Differ Equations</td>
<td>11.9-22.9% (7 semesters)</td>
<td>22.4%</td>
</tr>
</tbody>
</table>
Physics 1135 | Engineering Physics I | 11.2-28.0% (10 semesters) | 19.0%
Physics 2135 | Engineering Physics II | 10.8-20.4% (7 semesters) | 13.1%

* offered in Summer Semester 2015, 2016, 2017
** has not exceeded 10% in DFW

Observations from literature reviewed
Given the increased focus on retention and graduation rates across the country, a small number of articles and research papers were read and reviewed to determine if any best practices could be identified and moreover to observe if S&T was engaged in any observed.

An article titled “A Simple Method to Improve College Graduation Rates”, published in the Stanford Social Innovation Review identified the following 4 areas to help students succeed and graduate:

1. Stay on track to graduate – find a suitable major and understand requirements to graduate
2. Building their employability – part time jobs, resume writing, define a career path
3. Maintaining financial aid – scholarship renewal, smart financial decisions
4. Managing life – stay connected with people who care, positive attitude and resolve problems

A research study titled “Strategies to Increase Enrollment Retention, and Graduate Rates, published in the Journal of Developmental Education identified the engagement of “academic leaders” in the development of goals, programs, strategies, etc., as the major driver. Tracking systems and course design also has a positive impact on student success.

An article from the Chronical of Higher Education, titled “Fast Gainers: 4 Ways That Colleges Have Raised Graduation Rates” emphasized focusing on likely dropouts, building up advising services, involvement of diverse voices (faculty, students, administrators and community groups), and making logistical changes (course timing, overlap, etc.) as key factors for student success.

A Google search provided success stories from several universities. The University of Texas listed several strategies to include taking 15 hours per semester, taking online classes, enrolling in summer school and transferring credits from another institution, implementation of first year programs and groups, tracking tools, and paying for college in various ways. The same article notes that one size does not fit all and references Texas A&M, a STEM focused school.

The same search refers to the University of Georgia and the success they have had in increasing retention and graduation rates. Several items were identified including engaging in hands on learning, small class sizes (significant faculty hiring initiative), personalized support (extensive advising, use of digital tools for communication with students) and expansion of on-line course offerings, a summer experience program and predictive analytics.

An article from Educause Review titled “Using Big Data to Improve Retention and Graduation Rates” which identified addressing 4 year graduation rates in the following areas: Student acquisition (are we attracting the right type of students give our track record of successful 4-year graduation profiles,....; personalized curriculums; Student Performance (monitor, intervene, course correct); Student Retention (counselors/advisor, extracurricular, career opportunities);
Faculty Effectiveness (identify faculty, curriculum and/or other on-campus behaviors that predict to graduation problems and dropouts…); This article also identified the potential costs ($300,000) for two extra years of college and student debt load.

An article from the American Enterprise Institute titled “Completion Reforms That Work: How Leading Colleges Are Improving Attainment of High-Value Degrees” focused on 4 year programs and identified some initial lessons learned to include: There is no “plug and play” solution; New programs help only as long as they are active; Holistic beats piecemeal; and investing in access and success saves money. They also identified five promising returns identified as Practices.

1. Provide more seats for historically disadvantaged students at colleges with track records of producing successful graduates.
2. Provide comprehensive support to all types of students, especially those facing financial or academic challenges.
3. Provide Completion (or emergency) grants to juniors and seniors who need a little additional financial help reaching the finish line.
4. Using new data-gathering and analysis techniques to provide better and more useful guidance to students.
5. Use evidence-based teaching methods to improve instruction.

Each practice also identified specific examples, outcomes, potential impact, costs and implementation challenges.

A research article form the Journal of Science Education Technology titled “Hierarchical Mentoring: A Transformative Strategy for Improving Diversity and Retention in Undergraduate STEM Disciplines” emphasized the importance of integrating mentoring and strategic academic interventions. The research model is presented as: Mentoring (combinatory faculty, staff, and peer mentoring); Research (undergraduate research experiences); and Education (Academic support infrastructure, including advising, interventions and individualized development plans).

An article from the Florida State University Student Success Team titled “Practical Steps to Improving Retention and Graduation Rates” offers three critical elements to a successful retention/graduation program and 10 elements important to a sustained approach to retention/graduation.

The three critical elements are:
1. An individual, by status or personality, must drive the process.
2. A process based on detailed data must be developed, measured and monitored closely for at least five years.
3. There must be a team of individuals from across campus who are committed to student success and who meet weekly to assess progress.

The 10 elements include:
1. Develop a “map” of course schedules by term for every major with the critical courses highlighted. Holds and advisor intervention is also discussed if a class is not met by a student.
2. Establish an automated contact system.
3. Move academic advisors to the students and develop a structure that fosters professionalism and accountability among advisors.
4. Establish Freshman Interests Groups.
5. Pay attention to where students live.
6. Look at course grades. (courses with high percentages of Ds and Fs)
7. Survey students who choose to leave the university prior to graduation.
8. Do not neglect the full range of academic support services available to help engage and retain students.
9. Be willing to intervene early.
10. Be willing to deploy new approaches.

The article also notes specific examples of implementation at Florida State to include: Expanded academic advising services; A structured program to work with undecided (and also re-deciding) students; Success coaching; Expanded tutoring services; Special programing for first generation and Pell grant recipient students; Expanded opportunities for high-achieving students.

Based on this limited review of information it appears that Missouri S&T is engaged in many, if not all suggestions and best practices encountered. Perhaps two areas are somewhat lacking or require greater focus on our part. The practice of data analytics, in particular to truly mine the data to find out what is or is not happening is a challenge here due to no dedicated institution research, and a thorough understanding of what drives students to excel and graduate in 4 years, or 8 semesters with a co-op.

Recommendations
The original intent for this study was to run the basic data similar to the 2016-2017 student. However, this iteration of the total study also added specific information from one degree program (Engineering Management) and more limited information from Computer Science and a few CASB May 2019 graduates. Also, a limited literature review, looking for possible best practices, was added. Information on Ds, Fs, and WDs was requested from both colleges. This information sought to identify courses that may be impediments toward graduation. Thus this report provides a broader view of time to degree and total credit hour concerns.

As stated previously, the current data study basically replicates the prior data study. However, this study includes 8 academic years of data versus 5. It basically indicates a small percentage of students will graduate with the minimum number of credit hours for their programs. Average credit hours for FTC students in the three primary categories showed little difference with BS math and science programs averaging 146.6 credit hours and 5.0 years TTD, Non engineering BS and BA programs averaging 141 credit hours and 4.95 years TTD, and Teacher Certification programs averaging 152.6 credit hours and 5.2 years TTD. Although the same statistics are not presented in this report, the full data files do indicate slight increases in credit hour averages and TTD for value adding activities. The data also show some increasing trends in TTD, but basically settling around 5.0 years and average credit hours appears to be stable.

The deep degree audit reviews along with solicited input from May 2019 Engineering Management graduates provided much richer information as to the reasons students graduated in 4 years or
more (5, 6, 7+). It would be useful if all programs would commit to this type of review for both a spring and fall graduating class. If S&T wishes to increase both 4 and 6 year graduation rates, understanding the students perspective is key. It is time consuming, but may help to identify improvement strategies that may be unique to this campus.

The limited literature review offers much useful information and strategies. Many of those strategies and efforts are underway here at S&T to one degree or another. But it is clear that significant efforts and resources must be expended to improve retention and graduation rates. A general recommendation is for the campus to commit to a concerted effort to understand the dynamics, and the environment that impacts our retention and graduation rates and the strategies to provide positive movement. However, this effort may be beyond the scope of the Student Success Committee and may require a separate initiative or group to prove further.
APPENDIX A
Cumulative Retention & Graduation Rates of First-Time, Full-Time Degree Seeking Freshmen
APPENDIX B
Retention Strategies and Tactics
2001-2019
Retention Strategies and Tactics, 2001-2019

Assessment Enhancement

- Created standardized retention and graduation reports by gender and ethnicity and began measuring stop-out rate (students who withdraw and return), 2002
- Began annual retention audit of academic (cognitive) and demographic factors, 2001
- Instituted new-student survey in freshman Preview, Registration and Orientation (PRO sessions), 2002
- Re-instituted the Hogan Personality Index (HPI) assessment to track students by non-cognitive factors, 2002
- Revised withdraw surveys and interviews, 2002
- Started follow-up telephone surveys of non-returning students, 2002
- Began collection and campus-wide distribution of freshman academic profile, specifically new-student survey data about expectations, social activities, GPA, ACT/SAT scores, 2002
- Revised student satisfaction and engagement assessments, Cooperative Institution Research Program and National Survey of Student Engagement, 2001
- Identified classes with very low student success rates, grade of D, F or Withdraw, 2001
- Revised and re-launched the faculty and student advising survey, 2012
- Created graduate student focus groups and conducted interviews, 2016
- Created URM student focus group, 2019

Programming: Advising, Tutoring, Learning Communities, Faculty Training and Support

- Learning Enhancement Across Disciplines (LEAD) tutoring program expanded beyond physics classes, Fall 2002
- Joint Academic Management (JAM) sessions established, 2004
- Online tutor request program implemented, 2003
- Opening Week activities restructured around a group project activity, 2002 and 2003
- Expectations of student success addressed in all recruitment and orientation speeches, 2002
- Group building (making friends) and study skills addressed in all orientation and Opening Week activities, 2002–2003
- Advising program expanded with regular advisor training and awards, 2002
- Learning Communities and First-Year Experience Programs to address student academic skills development and social engagement through student life-oriented group events, 2002-2003
- Expanded freshman pre-college “Hit the Ground Running” program to address student academic expectations
- Created the Center for Pre-College Programs (CPCP) to expand the K-12 student workshops and science, technology, engineering, and mathematics (STEM) summer camps.
• Created the Center for Educational Research and Teaching Innovation (CERTI) to address improving the Missouri S&T learning environment and student learning outcomes through collaborative learning, experiential learning, technology enhanced learning, and educational research practices (September 4, 2003).
• Expanded experiential learning programs by promoting student engagement through student design teams, undergraduate research (OURe expansion) and service learning
• Implemented the Notification of Scholastic Probation Form, 2007
• Established the Undergraduate Advising Office, 2007
• Developed the On-Track Academic Success Program to assist probationary and academically deficient students, 2007
• Updated the online Missouri S&T Advising Handbook, 2011
• Implemented Majors & Minors, 2012
• Opened Burns and McDonnell Student Success Center, 2013
• Implemented Student Success Mentor Program for probationary admits, 2013
• Implemented Reconnection I & II, 2013
• Implemented Sophomore Summit, 2014
• Hired three professional staff advisors for FEP department, 2015
• Implemented Half-Way to Graduation event, 2016
• Hired Starfish staff member in Registrar’s office, 2016
• In process of creating advising council based on current recommendations (2017)
• Integrated Undergraduate Advising office and Freshmen Engineering office into one Central Advising office and moved location to Library (2019)

Policy Changes
• Incomplete grade time limit change, 2002
• Repeat course GPA adjustment policy, 2002
• Scholarship Reinstatement Policy, 2002
• All BS degree programs reduced to fall between 124 and 128 hours, 2002–2003
• Four degree programs most often requested by exiting students added: business, information science and technology, technical communication, and architectural engineering, 2002–2003
• Academic Forgiveness Policy, 2011-2012

Financial Assistance
• $285,000 additional need-based funding for first-time college students, 2012
• $80,000 institutional work study grant, 2014
• Spirit of Success Scholarship for high ability minority students, $264,500 was spent in new students and renewals, 2014-2015
• Secured $100,000 in funding for Hit the Ground Running and Institutional Work Study based on a proposal submitted to the UM System Comprehensive Retention Initiative (CRI), 2015-2016
• Finishline Scholarship, 2018
APPENDIX C
Other Documents
Enrollment Management:
Calculus Location Analysis

Presented By: Zach Monroe, Mark Shaw, Chris
Sheffield, Jonathan Stigge

Agenda

1. Problem Statement
2. Project Scope
3. Stakeholders
4. Project Management
   & Design
5. Methodology
6. Results
7. Recommendations
8. Conclusion
Introduction

- Continuation of previous semesters project
- Examining the merit of transfer schools mathematics courses
- Used statistical analysis tools to formulate recommendations

Problem Statement

“Missouri University of Science and Technology is concerned with the success of students who transfer in Calculus I and Calculus II from other universities in core engineering courses taken at Missouri S&T. These core engineering classes are Engineering Physics II (PHYS 2135), Statics (CE2200), and Mechanics of Materials (CE 2210).”
Project Scope

• Determine if there is a correlation between success course scores and Calculus I & II locations
• Show the statistical significance of the correlation and differences
• Provide recommendations for continuation of the study

Stakeholders

• Project Champion - Tim Albers
• Faculty Mentor - Dr. Enke
• Missouri S&T
  – Enrollment Management Department
  – Office of the Registrar
  – Current and future students
• Team Members
• Potential Transfer Universities
### Project Milestones

<table>
<thead>
<tr>
<th>Task</th>
<th>Assigned Completion Date</th>
<th>Completed on Time</th>
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<tbody>
<tr>
<td>Project Kickoff Meeting</td>
<td>2/4/19</td>
<td>Yes</td>
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<tr>
<td>Meeting with Project Champion</td>
<td>2/7/19</td>
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<tr>
<td>Meeting with Project Faculty Mentor</td>
<td>2/15/19</td>
<td>Yes</td>
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<tr>
<td>Complete Preliminary Research</td>
<td>3/11/19</td>
<td>Yes</td>
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<tr>
<td>Complete Statistical Analysis</td>
<td>4/15/19</td>
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</tr>
<tr>
<td>Complete Report</td>
<td>5/6/19</td>
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</tr>
<tr>
<td>Complete Presentation</td>
<td>5/6/19</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Project Management & Design

- Communicated through email, GroupMe, Google Team Drives
- Bi-weekly meetings
- Meetings with project champion and mentor for goals, advice, and direction

- Structured the project for seamless continuation for future studies
- With enough data, actions can be taken
Methodology

- **Pivot Tables**
  - Organizes and presents data in efficient manner
  - Break down students by calculus location
  - Shows overall pass rate for each transfer location and Missouri S&T
- **T-tests**
  - Utilized 2-sample t-test
  - Compared average success scores in core engineering classes based on Calculus I & II locations compared to Missouri S&T students

Results

- Large range of t-values and p-values
- Small sample sizes from transfer schools affected t-tests

Max t-values:  
Calc I - 6.66 Columbia College  
Calc II - 7.12

Columbia College

Min t-values:  
Calc I - -0.15 Jefferson College  
Calc II - -0.23

SCCC
## Calculus I Locations

<table>
<thead>
<tr>
<th>Calculus I Location</th>
<th>Corresponding T-value</th>
<th>Corresponding P-Value</th>
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<tbody>
<tr>
<td></td>
<td>Civ 2210</td>
<td>Civ 2200</td>
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<tr>
<td>SLU</td>
<td>-2.59</td>
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<tr>
<td>UMSL</td>
<td>0.46</td>
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<td>UMKC</td>
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<tr>
<td>Columbia College</td>
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<td>Jefferson College</td>
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<tr>
<td>SEMO</td>
<td>-0.45</td>
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<tr>
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<td>1.21</td>
<td>3.47</td>
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## Calculus II Locations

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<td>UND</td>
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<tr>
<td>SLCC/St. Vall.</td>
<td>1.17</td>
<td>3.85</td>
</tr>
</tbody>
</table>
Implementation

- Can’t be put into action immediately
- No immediate decisions can be made at this time
- Research will continue
- Once enough data is available, develop a transition plan to phase out unacceptable transfer programs

Recommendations

- Continue to collect data
- Examine other factors
  - Acceptance ACT scores
  - Acceptance GPA
  - Math placement exam scores
- Build an optimization model to determine a school’s mathematics courses merit
  - Use this score to determine if the school’s transfer credit should be accepted
Conclusion

- No actionable items can currently be determined
- Continue to collect data until sample sizes are statistically significant
- Use significant data to determine which schools have acceptable mathematics programs

Questions?
Enrollment Management: Calculus Location Analysis

To:
Dr. Stephen Raper

From:
Zach Monroe, Chris Sheffield, Jonathan Stigge, Mark Shaw

5/7/2019
EXECUTIVE SUMMARY

The group chose to do their senior design project for the Enrollment Management Department for Missouri University of Science and Technology. The department was looking for quantitative data that would demonstrate the presence or absence of a correlation between the location of where students took Calculus I and Calculus II and their subsequent grades in core engineering classes. The core engineer classes are Civ 2210 (Mechanics of Materials), Civ 2200 (Statics), Phys 2135 (Engineering Physics II). After meeting with the project champion and faculty mentor, the group was able to develop a scope of work for the project and select statistical analysis tools. Pivot tables and t-tests were the selected tools. The group decided to examine the top ten reporting universities for Calculus I and Calculus II and then compare the average success scores in each of the core engineering courses to the average success score in the core engineering courses of students who took Calculus I and Calculus II at Missouri S&T. The resulting t-test data shows the difference in average success scores. The higher to t-value, the higher the difference. The range of t-values from the t-test were high due to the difference in sample sizes. The group determined that more data needed to be collected before final decisions were made on which school’s mathematical credits should be accepted. The group also recommended that other factors should be examined to assist in building an optimization model. The model would give each school a score and that score would be compared to the minimum acceptable value that was generated from the optimization model. Developing a model would allow for the Enrollment Management Department to determine which schools credit would be accepted efficiently and quickly.
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PROBLEM STATEMENT

Missouri University of Science and Technology is concerned with the success of students who transfer in Calculus I and Calculus II from other universities in core engineering courses taken at Missouri S&T. These core engineering classes are Engineering Physics II (PHYS 2135), Statics (CE2200), and Mechanics of Materials (CE 2210). Mr. Albers, project champion, and the Enrollment Management Department are looking to see a correlation between the success or lack of success of transfer students and their scores in the core engineering classes. These correlations will be compared to the scores of students who have taken Calculus I and Calculus II at Missouri S&T. These issues and concerns were determined by the voice of the customer, Missouri University of Science and Technology.

PROJECT SCOPE

The project scope was defined as showing and determining the statistical significance and difference of students who took Calculus I and Calculus II at other universities and their resultant scores in core engineering courses compared to student who took Calculus I and Calculus II at Missouri S&T and their resultant scores in core engineering courses. The scope of work was developed with the project champion, Tim Albers. Mr. Albers was pleased with the agreed upon scope of work and believed it would give the Enrollment Management Department sufficient data and direction for future studies.

STAKEHOLDERS

Below is the stakeholder registry. It discusses direct and indirect stakeholder and their relationship to the project. The list is as comprehensive as needed in relation to this project. There are other possible stakeholder that could be affected but the group developed this registry based on who would be impacted the most.
<table>
<thead>
<tr>
<th>Name of Stakeholder</th>
<th>Project Role</th>
<th>Relationship to Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Shaw</td>
<td>Project Team Lead</td>
<td>In charge of the project team and communication between stakeholders Will help conduct research, analysis, and reporting of the project</td>
</tr>
<tr>
<td>Jonathan Stigge</td>
<td>Project Team Member</td>
<td>Will help conduct research, analysis, and reporting of the project</td>
</tr>
<tr>
<td>Zach Monroe</td>
<td>Project Team Member</td>
<td>Will help conduct research, analysis, and reporting of the project</td>
</tr>
<tr>
<td>Chris Sheffield</td>
<td>Project Team Member</td>
<td>Will help conduct research, analysis, and reporting of the project</td>
</tr>
<tr>
<td>Timothy Albers</td>
<td>Project Champion, MS&amp;T Vice Provost, Dean of MS&amp;T Enrollment Management Office</td>
<td>Provides project data and assists with determining the project scope</td>
</tr>
<tr>
<td>Dr. Enke</td>
<td>Project Mentor, Professor at MS&amp;T</td>
<td>Provides guidance and assistance in statistical analysis</td>
</tr>
<tr>
<td>MS&amp;T Enrollment Management Office</td>
<td>Project Organizational Sponsor</td>
<td>Helps the enrollment management office assist students with course placement in order to help them achieve success in future courses</td>
</tr>
<tr>
<td>MS&amp;T Office of the Registrar</td>
<td>Indirect stakeholder</td>
<td>Impacted by the outcome regarding more students taking courses at MS&amp;T instead of transferring</td>
</tr>
<tr>
<td>Current Students</td>
<td>Indirect stakeholder</td>
<td>Could change transfer credit requirements from certain colleges thus changing where the students take their courses</td>
</tr>
<tr>
<td>Future Students</td>
<td>Indirect stakeholder</td>
<td>Could change transfer credit requirements and cause some students to repeat classes at MS&amp;T Could ensure a better knowledge level for future students by ensuring the students are taking a certain standard of classes</td>
</tr>
</tbody>
</table>
LITERATURE REVIEW

Article One:

The group began researching our project by reviewing information and data provided to us from a student created report titled “Missouri S&T Calculus Analysis” by Sam Hardy, Jon Hudwalker, Jack Kirschbaum, Jasmine Kuehn, and Emily McClain. This report provided us with valuable data and information regarding whether or not students should be required to take Calculus I and Calculus II through the Missouri S&T mathematics department.

In their research, they looked into questionable assumptions made that a student who takes calculus class elsewhere, that they will be unsuccessful in their future core engineering classes. Their goal was to help demonstrate if students who take calculus courses at Missouri S&T are more likely to be successful in core engineering classes than those who transferred classes in said courses.

The researchers of the article, using a success course indicator, compared 4728 total students from over 74 universities. They compared the success rate & score of the top 5 transfer universities for each category. The categories were: Calculus I to Physics II, Calculus II to Physics II, Calculus I to Statics, Calculus II to Statics, Calculus I to Mechanics of Materials, and Calculus II to Mechanics of Materials.

From their results, the article gave four main recommendations due to their results. First, they recommended more research into why students were taking courses
elsewhere. Second, more data points for universities where there few students transferring, as to help find the root cause. Third, more information is needed in the students’ perception, to help find trends that aren’t identifiable quantitatively. Lastly, hypothesis testing should be done to determine if there is a statistical significance in the difference of success rates from those who take Calculus at Missouri S&T and those who transfer it to S&T.

This article was useful in that it helped give the group a solid starting point into how we should approach the project and the various areas of improvement.

**Insights from Project Champion**

The project champion was Mr. Tim Albers, the Vice Provost & Dean for Enrollment Management. Mr. Albers had the group continue this project from the previous semester as to help further improve with hypothesis testing to determine if claims of success that students transferring calculus classes to Missouri S&T were truly valid. The Enrollment Management Department wants to see hard data that will provide them with insight of which schools would or would not be acceptable for students to transfer their calculus credits. In our meeting with Tim Albers, the group and Mr. Albers discussed how the project should be continued, along with suggestions from the group on how to further improve the project.

At the conclusion of the meeting, it was decided by Mr. Albers and the group, that the group would perform a statistical analysis of the data acquired from the previous project and would do hypothesis testing to help predict how successful a student would be if they were to transfer a core mathematics class to Missouri S&T.

**PROJECT MANAGEMENT**

Once the group members were assigned to the team, meeting were scheduled with the project champion to develop a scope of work and means of communication. With a scope of work developed, the group was able to develop an approach to complete to the project. Bi-weekly meetings for the group were determined would be the most effective with the busy schedules of four graduating seniors. The group also utilized a Google Team Drive and the smartphone application “GroupMe” to communicate. These
tools provided an online platform to work on the analysis and save project related documents. Major tasks of the project were determined, and dates were assigned to keep the group on time. Mr. Albers, project champion, and Dr. Enke, faculty mentor, were sent emails throughout the process to keep them informed and to receive advice and input for guidance.

Timeline

The Gantnt Chart below displays the timeline for the entire project. It should be noted that the project and all subsequent tasks were completed on time. The milestones of the project will be discussed below.

Figure 1: Gantnt Chart for Calculus Location Analysis Project

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri S&amp;T Calculus Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Begin Preliminary Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Review Last Semester's Project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Meet with Champion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Meet with Project Advisor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Select Which Aspects the Group Would Like Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Complete Preliminary Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Begin Statistical Analysis &amp; Calculations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Input Data into MinTab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Review MinTab for Output Errors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Compare Data &amp; Evaluate Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Complete Statistical Analysis &amp; Calculations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Work on Presentation &amp; Final Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Write Research Paper Over Results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Complete Research Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Create Presentation Over the Findings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Complete-Presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>◦ Deliver Presentation With Research Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Milestones

The milestones for the project are listed in the table below. Determining these milestones were crucial to keeping the project on track to complete on time. Each task was completed on time. Not completing these tasks would not have allowed the group to successfully complete the project.
<table>
<thead>
<tr>
<th>Task</th>
<th>Assigned Completion Date</th>
<th>Completed on Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Kickoff Meeting</td>
<td>2/4/19</td>
<td>Yes</td>
</tr>
<tr>
<td>Meeting with Project Champion</td>
<td>2/7/19</td>
<td>Yes</td>
</tr>
<tr>
<td>Meeting with Project Faculty Mentor</td>
<td>2/15/19</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete Preliminary Research</td>
<td>3/11/19</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete Statistical Analysis</td>
<td>4/15/19</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete Report</td>
<td>5/5/19</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete Presentation</td>
<td>5/6/19</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 2: This table shows the major milestones of the project

PROJECT DESIGN

After meeting with the project champion and faculty mentor, it was determined that the project should be designed in a manner that would further the research from the previous semesters project and allow for further data to be collected and added to the analysis performed during this project. One of the potential issues that was brought to the group’s attention by Dr. Enke was the small sample size reported by some of the schools that were being examined and the effect it could have on the statistical analysis. The group believes that the structure of the analysis and report will allow for a future group to add new data to the analysis. The structure will allow for the effect of the small sample size to be negated as new data is collected and added to the analysis. Once the sample sizes of the smaller groups grow as more data is collected then conclusions could be developed about certain schools, such as whether Missouri S&T should accept the transfer Calculus credit.
METHODOLOGY

The group was tasked to determine if there was a correlation between the location of Calculus I and Calculus II and the resultant scores in core engineering classes. The group began by validating the data analysis from the previous semester. This allowed for the group to move forward knowing that the analysis was correct and could be used as part of the project. The previous project organized the data well with Pivot tables.

They provided the group with a direction of where to explore further. The group decided to examine the top ten universities by number of students reported for Calculus I and Calculus II. Each group member was assigned five schools to perform analysis. Pivot tables and a two-sample t-test in MiniTab were the tools the group chose to accomplish the task at hand. The group felt that these tools would be the most effective in analyzing and presenting the data to the Enrollment Management Department. These tools will be discussed in greater detail below.

Pivot Tables

Pivot Tables are a tool built in to the Microsoft Excel program. They are designed to help the user organize and present data in an efficient manner. Having data covering thousands of students, the group felt using this tool would be very effective. The resultant tables, show in the appendices, break down the students by the location where they took their calculus course and then by grade. These tables were broken down again to show the overall pass rate for Missouri S&T students, the top five reporting transfer schools, and then transfer students overall. Seeing the data broken down in this way, the group then decided that it would be more effective to breakdown the students by each school. The group decided to use the top ten reporting schools for Calculus I and Calculus II. Presenting the data by school will allow for a future project to collect data in the same way and build the sample size for each school. Once a sample size for a school is large enough, a decision can be made about the merit of a transfer credit from that university.

T-Tests
The group chose to utilize the two-sample t-test. This test examines the averages of two data sets. The average success scores in the core engineering courses of the students
who transferred Calculus I and or Calculus II credit were compared to the average success scores in the core engineering courses of students who took Calculus I and Calculus II at Missouri S&T. The resultant t-values and p-values tell the group which averages are similar. The smaller the t-value, the more likely it is that the averages of the two groups of students will be equal; meaning that a student from a given university did equally as well as the student from Missouri S&T and the credit from the transfer university should be acceptable. It should be noted that many of the universities reported very low sample sizes compared to the sample size of Missouri S&T students. This has affected the resultant t-values. As more data is collected and the sample sizes of the transfer schools increase, the t-values will be more accurate and significant.

RESULTS

The resulting t-values and p-values are summarized in the tables below. The ranges for each university are vastly different. As shown below, some of the t-values reach a magnitude of seven and a significant number of the schools have a p-value of zero. The inconsistency of these values can be explained by the small sample sizes of the transfer universities. The resultant analysis is not enough to make a definitive choice of which schools Missouri S&T should not accept Calculus I and Calculus II credit. More data will need to be collected and added to this project’s analysis.

<table>
<thead>
<tr>
<th>Calculus I Location</th>
<th>Corresponding T-value</th>
<th>Corresponding P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Civ 2210</td>
<td>Civ 2200</td>
</tr>
<tr>
<td>SLU</td>
<td>-2.59</td>
<td>-3.97</td>
</tr>
<tr>
<td>UMSL</td>
<td>0.46</td>
<td>0.67</td>
</tr>
<tr>
<td>SCCC</td>
<td>1.82</td>
<td>1.34</td>
</tr>
<tr>
<td>UMKC</td>
<td>-1.49</td>
<td>-1.48</td>
</tr>
<tr>
<td>Columbia College</td>
<td>3.39</td>
<td>5.06</td>
</tr>
<tr>
<td>Lincoln University</td>
<td>-0.85</td>
<td>-1.02</td>
</tr>
<tr>
<td>UCM</td>
<td>0.53</td>
<td>-0.57</td>
</tr>
<tr>
<td>Jefferson College</td>
<td>-0.15</td>
<td>0.48</td>
</tr>
<tr>
<td>SEMO</td>
<td>-0.45</td>
<td>0.44</td>
</tr>
<tr>
<td>SLCC Flor. Vall.</td>
<td>1.21</td>
<td>3.47</td>
</tr>
</tbody>
</table>

Table 3: This table shows the Calculus I locations and analysis
FINANCIAL INFORMATION

The cost to implement the project is minimal. The research and data analysis has been done by Engineering Management Senior Design Teams. The raw data was collected by Missouri S&T employees. There is not a requirement to purchase a new statistical modeling software. The current licenses the university has would be sufficient demonstrated by the fact that the analysis thus far has been completed with the current software available to students.

The financial impact on Missouri S&T would be far greater. If decisions were made to not accept credit for Calculus I and Calculus II from some of the universities that previously were, Missouri S&T would lose on the revenue from tuition from these potential students. Students are more likely to find another school that would accept their credits rather than retake their math courses. Of the students analyzed throughout the project, 2,622 took their calculus courses elsewhere. The university would not reject all of the schools that were analyzed. For each student that would not be allowed, the university would lose $53,432 per student. This number is based on the average cost to attend Missouri S&T for a Missouri resident for their junior and senior year, assuming that each transfer student is on a four-year graduation plan.
IMPLEMENTATION

Implementing the project will take time and can’t happen immediately. The group has demonstrated this by using previous data and analysis from a previous semester’s design team. Recommendations can be made, but no immediate decisions can be made. More data needs to be collected to make the analysis statistically significant. With more data, the results will hold more weight and decisions can be made about actionable items. Even with increased sample sizes for the transfer schools, decision will need to be made if excluding credit from a school can be solely determined on the success scores of students in core engineering courses or if other factors should be taken into account. For example, ACT scores, math placement scores, or grade point average. Once sample sizes have increased to an appropriate size, a transition plan will need to be developed to begin excluding schools credits. This is not a change that would be accepted overnight. It will take time to inform students and universities. The change could take place over the course of 4 years, the time it takes a class to graduate college.

PROJECT RISKS

The project presented three main risks: small sample sizes for transfer schools, hypothesis testing with prediction analysis, and financial impact of loss of potential students.

Small sample sizes for transfer schools were a major risk the group faced. A large quantity of data is needed to perform many of the tests the team needed to perform accurate predictions. To perform many of the tests that the group would like to have reviewed, a vast quantity of data is needed. For many of the tests in comparing the success scores to Missouri S&T students needed many students to make an accurate theory. For example, of the 1,948 Physics II grades analyzed, 360 students transferred in calculus I. Those transfer students made up 65 different universities, of which 57 had less than 10 points of data. Due to the small sample sizes, many of the tests the group wished to perform on various universities were not viable due to the lack of data.
Hypothesis testing with prediction analysis was another major issue the group faced. Due to the previously noted small sample sizes, predictions for the success of students transferring core mathematics classes from other universities was limited. More data will need to be collected and analyzed.

The loss of revenue from potential students was another risk for the project. Not accepting credits from certain universities may steer students to a different school that will accept their credit. Not allowing credit from schools could possibly limit the number of transfer students in the future.

**STAKEHOLDER IMPACT**

Stakeholder impact will vary for direct and indirect stakeholders. The members of the group will not be affected by the project except for the grade received which is needed to graduate.

The project champion and his office could be heavily affected. The decrease in transfer students could affect the performance metrics for the Enrollment Management Department in a negative way at first. Knowing which schools that provide transferable math credits could guide a student to those schools with the intention to transfer or they could come directly to Missouri S&T instead of transferring credit. This is a possibility for the future. It will not happen immediately. Transfer student enrollment will likely suffer at first because not all students will have the foresight to check if their mathematics credits will transfer.

Missouri S&T and the Office of the Registrar could also be heavily affected. Once again, it may be negative initially and then get better with time. The university could lose potential students to other universities if mathematics credits are no longer accepted from certain schools. The loss of these potential students would result in lost revenue from tuition costs. In the future, potential students could see the smaller list of acceptable transfer schools and choose to come to Missouri S&T directly which would boost revenue from tuition costs.

Future students and other universities will be affected in the same manner. Students will have a defined list of acceptable schools to transfer their mathematics credits and other
universities will know if they are on that list. Being on the list could boost their enrollment revenues. Students could also be forced to go to a different transfer school before coming to Missouri S&T which would adversely affect other schools. Students could also choose to come directly to Missouri S&T which would help the university.

FUTURE RECOMMENDATIONS

With the project design and structure set up for continuation and future projects, the team formulated recommendations based on the data analysis. Data must continue to be collected and added to the analysis the group completed. Once a sample size of 100 per class for each institution examined, a decision can be made on the merit of each school’s mathematics courses. As more data is collected, other factors for each university can be examined. Factors include acceptance ACT scores, acceptance GPA, and math placement exams. These factors be indicators of future success for students from their program. If the school has higher acceptance standards, then the students will be forced to work harder to succeed. As more data is collected and more factors are examined, the group recommends using the relevant data and factors to develop an optimization model to determine whether credits from a university are acceptable. With a well-developed model with proper constraints, the Enrollment Management Department would be able to determine which school’s mathematics credits should be accepted efficiently and quickly.

CONCLUSION

The statistical tools that were utilized were successful. The data analysis that came from the pivot tables and t-tests give some preliminary narratives for which universities should be accepted for transfer credit and it shows that more data should be collected. It was defined in the project design that the project would be set up for further research. The group accomplished this successfully. Recommendations were able to be formulated and verified by the data analysis. The project was a success.
REFERENCES

https://futurestudents.mst.edu/costs/cost-estimates/


# APPENDIX 1

## Pivot Tables

### Table 5: This table shows the average success scores of the core engineering courses based on Calc I location of Missouri S&T and transfer schools as a whole

<table>
<thead>
<tr>
<th>Success Course</th>
<th>CIV ENG 2200</th>
<th>CIV ENG 2210</th>
<th>PHYSICS 2135</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;T</td>
<td>2.751363141</td>
<td>2.782707622</td>
<td>2.784327323</td>
<td>2.774552193</td>
</tr>
<tr>
<td>Transfer</td>
<td>2.56281407</td>
<td>2.686956522</td>
<td>2.686507937</td>
<td>2.653351388</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>2.694296578</strong></td>
<td><strong>2.744841816</strong></td>
<td><strong>2.758992806</strong></td>
<td><strong>2.736585366</strong></td>
</tr>
</tbody>
</table>

### Table 6: This table shows the average success scores of the core engineering courses based on Calc II location of Missouri S&T and transfer schools as a whole

<table>
<thead>
<tr>
<th>Success Course</th>
<th>CIV ENG 2200</th>
<th>CIV ENG 2210</th>
<th>PHYSICS 2135</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;T</td>
<td>2.784860558</td>
<td>2.814589666</td>
<td>2.82115869</td>
<td>2.809164571</td>
</tr>
<tr>
<td>Transfer</td>
<td>2.40192926</td>
<td>2.597430407</td>
<td>2.483240223</td>
<td>2.507922535</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>2.694296578</strong></td>
<td><strong>2.744841816</strong></td>
<td><strong>2.758992806</strong></td>
<td><strong>2.736585366</strong></td>
</tr>
</tbody>
</table>

### Table 7: This table shows the breakdown of grades in Phys 2135 and the overall pass rate of the transfer schools

<table>
<thead>
<tr>
<th>Calc I Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>HR</th>
<th>I</th>
<th>Grand Total</th>
<th>Sort</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univ of Missouri - Kansas City</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>27</td>
<td>1</td>
<td>93%</td>
</tr>
<tr>
<td>Saint Charles County Comm Coll</td>
<td>3</td>
<td>9</td>
<td>15</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>28</td>
<td>2</td>
<td>96%</td>
</tr>
<tr>
<td>Columbia College - Saint Louis</td>
<td>1</td>
<td>3</td>
<td>18</td>
<td>8</td>
<td>1</td>
<td></td>
<td></td>
<td>31</td>
<td>3</td>
<td>71%</td>
</tr>
<tr>
<td>Univ of Missouri - Saint Louis</td>
<td>14</td>
<td>16</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38</td>
<td>4</td>
<td>100%</td>
</tr>
<tr>
<td>Saint Louis Univ Main Campus</td>
<td>21</td>
<td>14</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Transfer</td>
<td>124</td>
<td>162</td>
<td>170</td>
<td>32</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>506</td>
<td>6</td>
<td>90%</td>
</tr>
<tr>
<td>Missouri S&amp;T</td>
<td>355</td>
<td>546</td>
<td>445</td>
<td>58</td>
<td>35</td>
<td>3</td>
<td></td>
<td>1442</td>
<td>7</td>
<td>93%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calc II Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>HR</th>
<th>I</th>
<th>Grand Total</th>
<th>Sort</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozarks Technical Community Col</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>7</td>
<td>69%</td>
</tr>
<tr>
<td>Saint Louis Comm Col Flor Vall</td>
<td>9</td>
<td>13</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>6</td>
<td>73%</td>
</tr>
<tr>
<td>Univ of North Dakota Main Camp</td>
<td>3</td>
<td>7</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Saint Charles County Comm Coll</td>
<td>5</td>
<td>21</td>
<td>13</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>42</td>
<td>4</td>
<td>93%</td>
</tr>
<tr>
<td>Columbia College</td>
<td>3</td>
<td>22</td>
<td>30</td>
<td>12</td>
<td>4</td>
<td>1</td>
<td></td>
<td>72</td>
<td>3</td>
<td>76%</td>
</tr>
<tr>
<td>Transfer</td>
<td>58</td>
<td>120</td>
<td>134</td>
<td>29</td>
<td>17</td>
<td>1</td>
<td>1</td>
<td>360</td>
<td>2</td>
<td>87%</td>
</tr>
<tr>
<td>Missouri S&amp;T</td>
<td>421</td>
<td>588</td>
<td>481</td>
<td>61</td>
<td>34</td>
<td>3</td>
<td></td>
<td>1588</td>
<td>1</td>
<td>94%</td>
</tr>
</tbody>
</table>
Table 8: This table shows the breakdown of grades in Phys 2135 and the overall pass rate of the transfer schools
<table>
<thead>
<tr>
<th>Calculus I Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>HR</th>
<th>Grand Total</th>
<th>Sort</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri State University</td>
<td>4</td>
<td>14</td>
<td>12</td>
<td>3</td>
<td>1</td>
<td>34</td>
<td></td>
<td>1</td>
<td>0.8823529412</td>
</tr>
<tr>
<td>Jefferson College</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>34</td>
<td></td>
<td>2</td>
<td>0.8235294118</td>
</tr>
<tr>
<td>Saint Charles County Comm Coll</td>
<td>7</td>
<td>10</td>
<td>11</td>
<td>4</td>
<td>2</td>
<td>34</td>
<td></td>
<td>3</td>
<td>0.8235294118</td>
</tr>
<tr>
<td>Saint Louis Univ Main Campus</td>
<td>15</td>
<td>15</td>
<td>6</td>
<td>1</td>
<td></td>
<td>37</td>
<td></td>
<td>4</td>
<td>0.972972973</td>
</tr>
<tr>
<td>Ozarks Technical Community Col</td>
<td>12</td>
<td>14</td>
<td>19</td>
<td></td>
<td></td>
<td>45</td>
<td></td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Transfer</td>
<td>156</td>
<td>174</td>
<td>176</td>
<td>47</td>
<td>22</td>
<td>576</td>
<td></td>
<td>6</td>
<td>0.8784722222</td>
</tr>
<tr>
<td>Missouri S&amp;T</td>
<td>272</td>
<td>251</td>
<td>273</td>
<td>51</td>
<td>30</td>
<td>877</td>
<td></td>
<td>7</td>
<td>0.9076396807</td>
</tr>
</tbody>
</table>

*Table 9: This table shows the breakdown of grades in Civ 2210 and the overall pass rate of the transfer schools*

<table>
<thead>
<tr>
<th>Calculus II Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>HR</th>
<th>Grand Total</th>
<th>Sort</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral Area College</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td>13</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Saint Louis Comm Col Flor Vall</td>
<td>6</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td></td>
<td>24</td>
<td></td>
<td>2</td>
<td>0.875</td>
</tr>
<tr>
<td>East Central College</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>25</td>
<td></td>
<td>3</td>
<td>0.84</td>
</tr>
<tr>
<td>Ozarks Technical Community Col</td>
<td>13</td>
<td>16</td>
<td>25</td>
<td>1</td>
<td>1</td>
<td>56</td>
<td></td>
<td>4</td>
<td>0.9642857143</td>
</tr>
<tr>
<td>Saint Charles County Comm Coll</td>
<td>14</td>
<td>12</td>
<td>16</td>
<td>2</td>
<td></td>
<td>44</td>
<td></td>
<td>5</td>
<td>0.9545454545</td>
</tr>
<tr>
<td>Transfer</td>
<td>116</td>
<td>124</td>
<td>169</td>
<td>39</td>
<td>19</td>
<td>467</td>
<td></td>
<td>6</td>
<td>0.8758029979</td>
</tr>
<tr>
<td>Missouri S&amp;T</td>
<td>314</td>
<td>301</td>
<td>280</td>
<td>59</td>
<td>33</td>
<td>988</td>
<td></td>
<td>7</td>
<td>0.9058704453</td>
</tr>
</tbody>
</table>

*Table 10: This table shows the breakdown of grades in Civ 2210 and the overall pass rate of the transfer schools*

<table>
<thead>
<tr>
<th>Calc I Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>I</th>
<th>Grand Total</th>
<th>Sort</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saint Charles County Comm Coll</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>20</td>
<td></td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Univ of Missouri - Saint Louis</td>
<td>3</td>
<td>12</td>
<td>8</td>
<td>2</td>
<td></td>
<td>25</td>
<td></td>
<td>2</td>
<td>0.92</td>
</tr>
<tr>
<td>Lincoln University</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td>25</td>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Saint Louis Univ Main Campus</td>
<td>16</td>
<td>10</td>
<td>6</td>
<td></td>
<td></td>
<td>32</td>
<td></td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Columbia College</td>
<td>2</td>
<td>6</td>
<td>20</td>
<td>5</td>
<td>4</td>
<td>37</td>
<td></td>
<td>5</td>
<td>0.7567567568</td>
</tr>
<tr>
<td>Transfer</td>
<td>79</td>
<td>131</td>
<td>146</td>
<td>19</td>
<td>23</td>
<td>400</td>
<td></td>
<td>6</td>
<td>0.89</td>
</tr>
<tr>
<td>Missouri S&amp;T</td>
<td>209</td>
<td>353</td>
<td>302</td>
<td>24</td>
<td>29</td>
<td>920</td>
<td></td>
<td>7</td>
<td>0.9391304348</td>
</tr>
</tbody>
</table>

*Table 11: This table shows the breakdown of grades in Civ 2200 and the overall pass rate of the transfer schools*
<table>
<thead>
<tr>
<th>Calc II Location</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>HR</th>
<th>I</th>
<th>Grand Total</th>
<th>sort</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincoln University</td>
<td>5</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Univ of North Dakota Main Camp</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>18</td>
<td>2</td>
<td>0.8888888889</td>
</tr>
<tr>
<td>Saint Louis Comm Col Flor Vall</td>
<td>1</td>
<td>5</td>
<td>12</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td>23</td>
<td>3</td>
<td>0.7826086957</td>
</tr>
<tr>
<td>Saint Charles County Comm Coll</td>
<td>6</td>
<td>16</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td>35</td>
<td>4</td>
<td>0.8857142857</td>
</tr>
<tr>
<td>Columbia College</td>
<td>2</td>
<td>16</td>
<td>37</td>
<td>7</td>
<td>9</td>
<td></td>
<td></td>
<td>71</td>
<td>5</td>
<td>0.7746478873</td>
</tr>
<tr>
<td>Transfer</td>
<td>47</td>
<td>100</td>
<td>121</td>
<td>17</td>
<td>26</td>
<td>1</td>
<td>1</td>
<td>313</td>
<td>6</td>
<td>0.8562300319</td>
</tr>
<tr>
<td>Missouri S&amp;T</td>
<td>241</td>
<td>384</td>
<td>327</td>
<td>26</td>
<td>26</td>
<td>2</td>
<td>1</td>
<td>1007</td>
<td>7</td>
<td>0.9453823237</td>
</tr>
</tbody>
</table>

*Table 12: This table shows the breakdown of grades in Civ 2200 and the overall pass rate of the transfer schools*

<table>
<thead>
<tr>
<th>Calc I Location</th>
<th>Calc II Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri S&amp;T</td>
<td>Transfer</td>
</tr>
<tr>
<td>Physics 2135</td>
<td>90.78%</td>
</tr>
<tr>
<td>Civil Eng 2200</td>
<td>93.91%</td>
</tr>
<tr>
<td>Civil Eng 2210</td>
<td>90.78%</td>
</tr>
<tr>
<td></td>
<td>Missouri S&amp;T</td>
</tr>
<tr>
<td></td>
<td>93.84%</td>
</tr>
<tr>
<td></td>
<td>94.54%</td>
</tr>
<tr>
<td></td>
<td>90.59%</td>
</tr>
</tbody>
</table>

*Table 13: This table shows the overall pass rates of Missouri S&T and transfer students based on their Calc location*
APPENDIX 2

Saint Charles County Community College T-test Data

Two-Sample T-Test and CI: MST - Civ 2210, SCC - Civ 2210

Method

\( \mu_1 \): mean of MST - Civ 2210
\( \mu_2 \): mean of SCC - Civ 2210

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>SCC - Civ 2210</td>
<td>34</td>
<td>2.47</td>
<td>1.13</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.36</td>
<td>(-0.042, 0.762)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.82</td>
<td>35</td>
<td>0.078</td>
</tr>
</tbody>
</table>

*Table 14: The table shows the t-test results for SCCC Calc I and Civ 2210*
### Two-Sample T-Test and CI: MST- Civ 2200, SCC - Civ 2200

**Method**

- $\mu_1$: mean of MST- Civ 2200
- $\mu_2$: mean of SCC - Civ 2200
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
<td></td>
</tr>
<tr>
<td>SCC - Civ 2200</td>
<td>20</td>
<td>2.45</td>
<td>0.999</td>
<td>0.22</td>
<td></td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.301</td>
<td>(-0.171, 0.773)</td>
</tr>
</tbody>
</table>

**Test**

- **Null hypothesis**
  - $H_0$: $\mu_1 - \mu_2 = 0$
- **Alternative hypothesis**
  - $H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.34</td>
<td>19</td>
<td>0.197</td>
</tr>
</tbody>
</table>

*Table 15: The table shows the t-test results for SCCC Calc I and Civ 2200*
### Two-Sample T-Test and CI: MST - Physics 2, SCC - Physics 2

#### Method

- $μ_1$: mean of MST - Physics 2
- $μ_2$: mean of SCC - Physics 2
- Difference: $μ_1 - μ_2$

*Equal variances are not assumed for this analysis.*

#### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>SCC - Physics 2</td>
<td>29</td>
<td>2.483</td>
<td>0.738</td>
<td>0.14</td>
</tr>
</tbody>
</table>

#### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.302</td>
<td>(0.017, 0.586)</td>
</tr>
</tbody>
</table>

#### Test

- **Null hypothesis**: $H_0$: $μ_1 - μ_2 = 0$
- **Alternative hypothesis**: $H_1$: $μ_1 - μ_2 ≠ 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.17</td>
<td>29</td>
<td>0.039</td>
</tr>
</tbody>
</table>

*Table 16: The table shows the t-test results for SCCC Calc I and Phys 2135*
Two-Sample T-Test and CI: MST - Civ 2210, SCCC - Civ 2210

Method
\( \mu_1: \) mean of MST - Civ 2210
\( \mu_2: \) mean of SCCC - Civ 2210
Difference: \( \mu_1 - \mu_2 \)

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td>0.038</td>
</tr>
<tr>
<td>SCCC - Civ 2210</td>
<td>44</td>
<td>2.864</td>
<td>0.93</td>
<td>0.14</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.033</td>
<td>(-0.325, 0.259)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.23</td>
<td>49</td>
<td>0.821</td>
</tr>
</tbody>
</table>

Table 17: The table shows the t-test results for SCCC Calc II and Civ 2210
Two-Sample T-Test and CI: MST - Civ 2200, SCCC - Civ 2200

Method

\( \mu_1 \): mean of MST - Civ 2200

\( \mu_2 \): mean of SCCC - Civ 2200

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>SCCC - Civ 2200</td>
<td>34</td>
<td>2.706</td>
<td>0.938</td>
<td>0.16</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.081</td>
<td>(-0.253, 0.414)</td>
</tr>
</tbody>
</table>

### Test

- **Null hypothesis**
  \[ H_0: \mu_1 - \mu_2 = 0 \]

- **Alternative hypothesis**
  \[ H_1: \mu_1 - \mu_2 \neq 0 \]

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.49</td>
<td>35</td>
<td>0.627</td>
</tr>
</tbody>
</table>

*Table 18: The table shows the t-test results for SCCC Calc II and Civ 2200*
Two-Sample T-Test and CI: MST - Phy 2, SCCC - Phy 2

Method

μ₁: mean of MST - Phy 2
μ₂: mean of SCCC - Phy 2
Difference: μ₁ - μ₂

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>SCCC - Phy 2</td>
<td>42</td>
<td>2.643</td>
<td>0.85</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.157</td>
<td>(-0.113, 0.426)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

H₀: μ₁ - μ₂ = 0

Alternative hypothesis

H₁: μ₁ - μ₂ ≠ 0

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.17</td>
<td>44</td>
<td>0.248</td>
</tr>
</tbody>
</table>

Table 19: The table shows the t-test results for SCCC Calc II and Phys 2135
APPENDIX 3

University of Missouri – Kansas City T-test Data

Two-Sample T-Test and CI: MST - Civ 2210, UMKC - Civ 2210

Method

- $\mu_1$: mean of MST - Civ 2210
- $\mu_2$: mean of UMKC - Civ 2210
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td>0.038</td>
</tr>
<tr>
<td>UMKC - Civ 2210</td>
<td>12</td>
<td>3.25</td>
<td>0.965</td>
<td>0.28</td>
<td>0.28</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.419</td>
<td>(-1.038, 0.199)</td>
</tr>
</tbody>
</table>

**Test**

Null hypothesis

$H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.49</td>
<td>11</td>
<td>0.164</td>
</tr>
</tbody>
</table>

*Table 20: The table shows the t-test results for UMKC Calc I and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, UMKC - Civ 2200

Method

\( \mu_1 \): mean of MST - Civ 2200

\( \mu_2 \): mean of UMKC - Civ 2200

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
</tr>
<tr>
<td>UMKC - Civ 2200</td>
<td>15</td>
<td>3.133</td>
<td>0.99</td>
<td>0.26</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.382</td>
<td>(-0.934, 0.171)</td>
</tr>
</tbody>
</table>

### Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.48</td>
<td>14</td>
<td>0.16</td>
</tr>
</tbody>
</table>

*Table 21: The table shows the t-test results for UMKC Calc I and Civ 2200*
Two-Sample T-Test and CI: MST - Physics 2, UMKC - Physics 2

Method

\( \mu_1 \): mean of MST - Physics 2
\( \mu_2 \): mean of UMKC - Physics 2
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>UMKC - Physics 2</td>
<td>27</td>
<td>3.037</td>
<td>0.94</td>
<td>0.18</td>
<td></td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.253</td>
<td>(-0.628, 0.123)</td>
</tr>
</tbody>
</table>

### Test

Null hypothesis
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.38</td>
<td>26</td>
<td>0.178</td>
</tr>
</tbody>
</table>

*Table 22: The table shows the t-test results for UMKC Calc I and Phys 2135*
**Two-Sample T-Test and CI: MST - Civ 2210, UMKC - Civ 2210**

**Method**

\[ \mu_1: \text{mean of MST - Civ 2210} \]
\[ \mu_2: \text{mean of UMKC - Civ 2210} \]

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>UMKC - Civ 2210</td>
<td>4</td>
<td>3.25</td>
<td>0.957</td>
<td>0.48</td>
<td></td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.419</td>
<td>(-1.948, 1.109)</td>
</tr>
</tbody>
</table>

**Test**

Null hypothesis

\[ H_0: \mu_1 - \mu_2 = 0 \]

Alternative hypothesis

\[ H_1: \mu_1 - \mu_2 \neq 0 \]

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.87</td>
<td>3</td>
<td>0.447</td>
</tr>
</tbody>
</table>

*Table 23: The table shows the t-test results for UMKC Calc II and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, UMKC - Civ 2200

Method

$\mu_1$: mean of MST - Civ 2200

$\mu_2$: mean of UMKC - Civ 2200

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
<td>0.033</td>
<td>0.033</td>
<td>0.033</td>
</tr>
<tr>
<td>UMKC - Civ 2200</td>
<td>5</td>
<td>2.8</td>
<td>1.3</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.014</td>
<td>(-1.635, 1.608)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

$H_0$: $\mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.02</td>
<td>4</td>
<td>0.983</td>
</tr>
</tbody>
</table>

*Table 24: The table shows the t-test results for UMKC Calc II and Civ 2200*
Two-Sample T-Test and CI: MST - Phy 2, UMKC - Phy 2

Method
\( \mu_1 \): mean of MST - Phy 2
\( \mu_2 \): mean of UMKC - Phy 2
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>UMKC - Phy 2</td>
<td>8</td>
<td>3.25</td>
<td>0.866</td>
<td>0.31</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.45</td>
<td>(-1.194, 0.293)</td>
</tr>
</tbody>
</table>

### Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.43</td>
<td>7</td>
<td>0.195</td>
</tr>
</tbody>
</table>

*Table 25: The table shows the t-test results for UMKC Calc II and Phys 2135*
# APPENDIX 4

## Columbia College T-test Data

### Two-Sample T-Test and CI: MST - Civ 2210, Columbia Col - Civ 2210

**Method**
- \( \mu_1 \): mean of MST - Civ 2210
- \( \mu_2 \): mean of Columbia Col - Civ 2210
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>Columbia Col - Civ 2210</td>
<td>27</td>
<td>2.15</td>
<td>1.03</td>
<td>0.2</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.682</td>
<td>(0.270, 1.095)</td>
</tr>
</tbody>
</table>

### Test

- **Null hypothesis**
  - \( H_0: \mu_1 - \mu_2 = 0 \)

- **Alternative hypothesis**
  - \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.39</td>
<td>27</td>
<td>0.002</td>
</tr>
</tbody>
</table>

*Table 26: The table shows the t-test results for Columbia College Calc I and Civ 2210*
Two-Sample T-Test and CI: MST- Civ 2200, Columbia Col - Civ 2200

Method

$\mu_1$: mean of MST- Civ 2200

$\mu_2$: mean of Columbia Col - Civ 2200

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
</tr>
<tr>
<td>Columbia Col - Civ 2200</td>
<td>37</td>
<td>1.919</td>
<td>0.983</td>
<td>0.16</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.832</td>
<td>(0.499, 1.165)</td>
</tr>
</tbody>
</table>

### Test

**Null hypothesis**

$H_0$: $\mu_1 - \mu_2 = 0$

**Alternative hypothesis**

$H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.06</td>
<td>38</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 27: The table shows the t-test results for Columbia College Calc I and Civ 2200*
Two-Sample T-Test and CI: MST - Physics 2, Columbia Col - Physics 2

Method
\( \mu_1 \): mean of MST - Physics 2
\( \mu_2 \): mean of Columbia Col - Physics 2
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>Columbia Col - Physics 2</td>
<td>31</td>
<td>1.839</td>
<td>0.779</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.946</td>
<td>(0.656, 1.235)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.66</td>
<td>31</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 28: The table shows the t-test results for Columbia College Calc I and Phys 2135*
### Two-Sample T-Test and CI: MST - Civ 2210, Columbia Col - Civ 2210

#### Method

- \( \mu_1 \): mean of MST - Civ 2210
- \( \mu_2 \): mean of Columbia Col - Civ 2210
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

#### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>Columbia Col - Civ 2210</td>
<td>54</td>
<td>2.13</td>
<td>1.03</td>
<td>0.14</td>
</tr>
</tbody>
</table>

#### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.701</td>
<td>(0.411, 0.991)</td>
</tr>
</tbody>
</table>

#### Test

- **Null hypothesis:** \( H_0: \mu_1 - \mu_2 = 0 \)
- **Alternative hypothesis:** \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.84</td>
<td>60</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 29: The table shows the t-test results for Columbia College Calc II and Civ 2210*
## Two-Sample T-Test and CI: MST - Civ 2200, Columbia Col - Civ 2200

### Method

- \( \mu_1 \): mean of MST - Civ 2200
- \( \mu_2 \): mean of Columbia Col - Civ 2200
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>Columbia Col - Civ 2200</td>
<td>71</td>
<td>1.93</td>
<td>0.976</td>
<td>0.12</td>
<td></td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.857</td>
<td>(0.617, 1.096)</td>
</tr>
</tbody>
</table>

### Test

- **Null hypothesis**: \( H_0: \mu_1 - \mu_2 = 0 \)
- **Alternative hypothesis**: \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.12</td>
<td>81</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 30: The table shows the t-test results for Columbia College Calc II and Civ 2200*
Two-Sample T-Test and CI: MST - Phy 2, Columbia Col - Phy 2

Method

\( \mu_1 \): mean of MST - Phy 2

\( \mu_2 \): mean of Columbia Col - Phy 2

Difference: \( \mu_1 - \mu_2 \)

(Equal variances are not assumed for this analysis.)

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>Columbia Col - Phy 2</td>
<td>71</td>
<td>2.113</td>
<td>0.934</td>
<td>0.11</td>
<td></td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.687</td>
<td>(0.460, 0.914)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.03</td>
<td>78</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 31: The table shows the t-test results for Columbia College Calc II and Phys 2135*
APPENDIX 5

Lincoln University T-test Data

Two-Sample T-Test and CI: MST - Civ 2210, Lincoln - Civ 2210

Method

μ₁: mean of MST - Civ 2210
μ₂: mean of Lincoln - Civ 2210
Diference: μ₁ - μ₂

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>Lincoln - Civ 2210</td>
<td>13</td>
<td>3.08</td>
<td>1.04</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.246</td>
<td>(-0.879, 0.386)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

H₀: μ₁ - μ₂ = 0

Alternative hypothesis

H₁: μ₁ - μ₂ ≠ 0

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.85</td>
<td>12</td>
<td>0.413</td>
</tr>
</tbody>
</table>

*Table 32: The table shows the t-test results for Lincoln University Calc I and Civ 2210*
### Two-Sample T-Test and CI: MST- Civ 2200, Lincoln - Civ 2200

#### Method

\( \mu_1: \) mean of MST- Civ 2200  
\( \mu_2: \) mean of Lincoln - Civ 2200  

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

#### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
<td>0.031</td>
<td></td>
</tr>
<tr>
<td>Lincoln - Civ 2200</td>
<td>25</td>
<td>2.92</td>
<td>0.812</td>
<td>0.16</td>
<td>0.16</td>
<td></td>
</tr>
</tbody>
</table>

#### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.169</td>
<td>(-0.509, 0.172)</td>
</tr>
</tbody>
</table>

#### Test

Null hypothesis  
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis  
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.02</td>
<td>25</td>
<td>0.318</td>
</tr>
</tbody>
</table>

*Table 33: The table shows the t-test results for Lincoln University Calc I and Civ 2200*
Two-Sample T-Test and CI: MST - Physics 2, Lincoln - Physics 2

Method

$\mu_1$: mean of MST - Physics 2

$\mu_2$: mean of Lincoln - Physics 2

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>Lincoln - Physics 2</td>
<td>27</td>
<td>3.111</td>
<td>0.751</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.327</td>
<td>(-0.628, -0.026)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.23</td>
<td>27</td>
<td>0.034</td>
</tr>
</tbody>
</table>

*Table 34: The table shows the t-test results for Lincoln University Calc I and Phys 2135*
**Two-Sample T-Test and CI: MST - Civ 2210, Lincoln - Civ 2210**

**Method**

- $\mu_1$: mean of MST - Civ 2210
- $\mu_2$: mean of Lincoln - Civ 2210
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>Lincoln - Civ 2210</td>
<td>15</td>
<td>2.533</td>
<td>0.99</td>
<td>0.26</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.297</td>
<td>(-0.257, 0.852)</td>
</tr>
</tbody>
</table>

**Test**

- Null hypothesis: $H_0: \mu_1 - \mu_2 = 0$
- Alternative hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.15</td>
<td>14</td>
<td>0.269</td>
</tr>
</tbody>
</table>

*Table 35: The table shows the t-test results for Lincoln University Calc II and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, Lincoln - Civ 2200

Method

$\mu_1$: mean of MST - Civ 2200

$\mu_2$: mean of Lincoln - Civ 2200

Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>Lincoln - Civ 2200</td>
<td>12</td>
<td>2.417</td>
<td>0.515</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.37</td>
<td>(0.038, 0.701)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

$H_0$: $\mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.43</td>
<td>12</td>
<td>0.032</td>
</tr>
</tbody>
</table>

Table 36: The table shows the t-test results for Lincoln University Calc II and Civ 2200
Two-Sample T-Test and CI: MST - Phy 2, Lincoln - Phy 2

Method

\( \mu_1 \): mean of MST - Phy 2

\( \mu_2 \): mean of Lincoln - Phy 2

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>Lincoln - Phy 2</td>
<td>11</td>
<td>3.091</td>
<td>0.701</td>
<td>0.21</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.291</td>
<td>(-0.766, 0.183)</td>
</tr>
</tbody>
</table>

**Test**

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.37</td>
<td>10</td>
<td>0.201</td>
</tr>
</tbody>
</table>

*Table 37: The table shows the t-test results for Lincoln University Calc II and Phys 2135*


**APPENDIX 6**

**University of Central Missouri T-test Data**

**Two-Sample T-Test and CI: MST - Civ 2210, Central MO - Civ 2210**

**Method**
- $\mu_1$: mean of MST - Civ 2210
- $\mu_2$: mean of Central MO - Civ 2210
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>Central MO - Civ 2210</td>
<td>6</td>
<td>2.5</td>
<td>1.52</td>
<td>0.62</td>
<td></td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.331</td>
<td>(-1.264, 1.925)</td>
</tr>
</tbody>
</table>

**Test**

- **Null hypothesis**
  - $H_0$: $\mu_1 - \mu_2 = 0$

- **Alternative hypothesis**
  - $H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.53</td>
<td>5</td>
<td>0.617</td>
</tr>
</tbody>
</table>

*Table 38: The table shows the t-test results for UCM Calc I and Civ 2210*
### Two-Sample T-Test and CI: MST- Civ 2200, Central MO - Civ 2200

#### Method

- $\mu_1$: mean of MST- Civ 2200
- $\mu_2$: mean of Central MO - Civ 2200
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

#### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
</tr>
<tr>
<td>Central MO - Civ 2200</td>
<td>12</td>
<td>2.917</td>
<td>0.996</td>
<td>0.29</td>
</tr>
</tbody>
</table>

#### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.165</td>
<td>(-0.802, 0.471)</td>
</tr>
</tbody>
</table>

#### Test

- **Null hypothesis**: $H_0: \mu_1 - \mu_2 = 0$
- **Alternative hypothesis**: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.57</td>
<td>11</td>
<td>0.579</td>
</tr>
</tbody>
</table>

*Table 39: The table shows the t-test results for UCM Calc I and Civ 2200*
Two-Sample T-Test and CI: MST - Physics 2, Central MO - Physics 2

Method

$\mu_1$: mean of MST - Physics 2

$\mu_2$: mean of Central MO - Physics 2

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>Central MO - Physics 2</td>
<td>26</td>
<td>3.346</td>
<td>0.797</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.562</td>
<td>(-0.887, -0.236)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

$H_0$: $\mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.55</td>
<td>26</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*Table 40: The table shows the t-test results for UCM Calc I and Phys 2135*
Two-Sample T-Test and CI: MST - Civ 2210, Central MO - Civ 2210

Method
\( \mu_1 \): mean of MST - Civ 2210
\( \mu_2 \): mean of Central MO - Civ 2210
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>Central MO - Civ 2210</td>
<td>6</td>
<td>3.67</td>
<td>0.52</td>
<td>0.21</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.836</td>
<td>(-1.387, -0.286)</td>
</tr>
</tbody>
</table>

### Test

Null hypothesis
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.9</td>
<td>5</td>
<td>0.011</td>
</tr>
</tbody>
</table>

*Table 41: The table shows the t-test results for UCM Calc II and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, Central MO - 2200

Method

\( \mu_1 \): mean of MST - Civ 2200

\( \mu_2 \): mean of Central MO - 2200

Difference: \( \mu_1 - \mu_2 \)

Equal variances are not assumed for this analysis.

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE  Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>Central MO - 2200</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0.58</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.214</td>
<td>(-2.702, 2.275)</td>
</tr>
</tbody>
</table>

### Test

<table>
<thead>
<tr>
<th></th>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.37</td>
<td>2</td>
<td>0.747</td>
</tr>
</tbody>
</table>

*Table 42: The table shows the t-test results for UCM Calc II and Civ 2200*
Two-Sample T-Test and CI: MST - Phy 2, Central MO - Phy 2

Method

\( \mu_1 \): mean of MST - Phy 2

\( \mu_2 \): mean of Central MO - Phy 2

Difference: \( \mu_1 - \mu_2 \)

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>Central MO - Phy 2</td>
<td>8</td>
<td>3</td>
<td>1.07</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.2</td>
<td>(-1.096, 0.695)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.53</td>
<td>7</td>
<td>0.613</td>
</tr>
</tbody>
</table>

Table 43: The table shows the t-test results for UCM Calc II and Phys 2135
# APPENDIX 7

## Southeastern Missouri State University T-test Data

### Two-Sample T-Test and CI: MST - Civ 2210, SEMO - Civ 2210

**Method**

- \( \mu_1 \): mean of MST - Civ 2210
- \( \mu_2 \): mean of SEMO - Civ 2210
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

#### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>SEMO - Civ 2210</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>0.38</td>
<td></td>
</tr>
</tbody>
</table>

#### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.169</td>
<td>(-1.099, 0.760)</td>
</tr>
</tbody>
</table>

#### Test

- **Null hypothesis**: \( H_0: \mu_1 - \mu_2 = 0 \)
- **Alternative hypothesis**: \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.45</td>
<td>6</td>
<td>0.671</td>
</tr>
</tbody>
</table>

*Table 44: The table shows the t-test results for SEMO Calc 1 and Civ 2210*
Two-Sample T-Test and CI: MST- Civ 2200, SEMO - Civ 2200

Method

\( \mu_1 \): mean of MST- Civ 2200
\( \mu_2 \): mean of SEMO - Civ 2200

Difference: \( \mu_1 - \mu_2 \)

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
</tr>
<tr>
<td>SEMO - Civ 2200</td>
<td>16</td>
<td>2.63</td>
<td>1.15</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.126</td>
<td>(-0.489, 0.741)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.44</td>
<td>15</td>
<td>0.668</td>
</tr>
</tbody>
</table>

Table 45: The table shows the t-test results for SEMO Calc I and Civ 2200
# Two-Sample T-Test and CI: MST - Physics 2, SEMO - Physics 2

## Method

- $\mu_1$: mean of MST - Physics 2
- $\mu_2$: mean of SEMO - Physics 2
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

## Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEMO - Physics 2</td>
<td>19</td>
<td>2.58</td>
<td>1.07</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.205</td>
<td>(-0.313, 0.724)</td>
</tr>
</tbody>
</table>

## Test

- **Null hypothesis**
  
  $H_0: \mu_1 - \mu_2 = 0$

- **Alternative hypothesis**
  
  $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.83</td>
<td>18</td>
<td>0.416</td>
</tr>
</tbody>
</table>

*Table 46: The table shows the t-test results for SEMO Calc I and Phys 2135*
Two-Sample T-Test and CI: MST - Civ 2210, SE Missouri - Civ 2210

Method
\( \mu_1 \): mean of MST - Civ 2210
\( \mu_2 \): mean of SE Missouri - Civ 2210
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>SE Missouri - Civ 2210</td>
<td>11</td>
<td>2.727</td>
<td>0.905</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.103</td>
<td>(-0.510, 0.717)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.38</td>
<td>10</td>
<td>0.715</td>
</tr>
</tbody>
</table>

*Table 47: The table shows the t-test results for SEMO Calc II and Civ 2210*
# Two-Sample T-Test and CI: MST - Civ 2200, SE Missouri - Civ 2200

## Method
- $\mu_1$: mean of MST - Civ 2200
- $\mu_2$: mean of SE Missouri - Civ 2200
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

## Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>SE Missouri - Civ 2200</td>
<td>9</td>
<td>2.67</td>
<td>1.22</td>
<td>0.41</td>
</tr>
</tbody>
</table>

## Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.12</td>
<td>(-0.825, 1.064)</td>
</tr>
</tbody>
</table>

## Test

- **Null hypothesis**
  - $H_0: \mu_1 - \mu_2 = 0$

- **Alternative hypothesis**
  - $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.29</td>
<td>8</td>
<td>0.777</td>
</tr>
</tbody>
</table>

*Table 48: The table shows the t-test results for SEMO Calc II and Civ 2200*
## Two-Sample T-Test and CI: MST - Phy 2, SE Missouri - Phy 2

### Method

\( \mu_1 \): mean of MST - Phy 2  
\( \mu_2 \): mean of SE Missouri - Phy 2  

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>SE Missouri - Phy 2</td>
<td>11</td>
<td>2.82</td>
<td>1.6</td>
<td>0.48</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.019</td>
<td>(-1.096, 1.059)</td>
</tr>
</tbody>
</table>

### Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.04</td>
<td>10</td>
<td>0.97</td>
</tr>
</tbody>
</table>

*Table 49: The table shows the t-test results for SEMO Calc II and Phys 2135*
APPENDIX 8

St. Louis Community College – Florissant Valley T-test Data

Two-Sample T-Test and CI: MST - Civ 2210, STL CC Flor Vall - Civ 2210

Method

\( \mu_1 \): mean of MST - Civ 2210

\( \mu_2 \): mean of STL CC Flor Vall - Civ 2210

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
</tr>
<tr>
<td>STL CC Flor Vall - Civ 2210</td>
<td>4</td>
<td>2.25</td>
<td>0.957</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.581</td>
<td>(-0.948, 2.109)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.21</td>
<td>3</td>
<td>0.313</td>
</tr>
</tbody>
</table>

*Table 50: The table shows the t-test results for STLCC-Flo Val Calc I and Civ 2210*
Two-Sample T-Test and CI: MST- Civ 2200, STL CC Flor Vall - Civ 2200

Method

μ₁: mean of MST- Civ 2200
μ₂: mean of STL CC Flor Vall - Civ 2200
Difference: μ₁ - μ₂

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
<td>0.031</td>
</tr>
<tr>
<td>STL CC Flor Vall - Civ 2200</td>
<td>16</td>
<td>1.938</td>
<td>0.929</td>
<td>0.23</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.814</td>
<td>(0.315, 1.313)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

H₀: μ₁ - μ₂ = 0

Alternative hypothesis

H₁: μ₁ - μ₂ ≠ 0

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.47</td>
<td>15</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Table 51: The table shows the t-test results for STLCC-Flo Val Calc I and Civ 2200
Two-Sample T-Test and CI: MST - Physics 2, STL CC Flor Vall - Physics 2

Method

$\mu_1$: mean of MST - Physics 2

$\mu_2$: mean of STL CC Flor Vall - Physics 2

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>STL CC Flor Vall - Physics 2</td>
<td>20</td>
<td>1.75</td>
<td>1.02</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.034</td>
<td>(0.554, 1.514)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

$H_0$: $\mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1$: $\mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.51</td>
<td>19</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 52: The table shows the t-test results for STLCC-Flo Val Calc I and Phys 2135*
Two-Sample T-Test and CI: MST - Civ 2210, ST Louis CC - Civ 2210

Method

$\mu_1$: mean of MST - Civ 2210

$\mu_2$: mean of ST Louis CC - Civ 2210

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>ST Louis CC - Civ 2210</td>
<td>24</td>
<td>2.58</td>
<td>1.02</td>
<td>0.21</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.247</td>
<td>(-0.189, 0.683)</td>
</tr>
</tbody>
</table>

**Test**

Null hypothesis

$H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.17</td>
<td>24</td>
<td>0.253</td>
</tr>
</tbody>
</table>

*Table 53: The table shows the t-test results for STLCC-Flo Val Calc II and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, ST Louis CC - Civ 2200

Method

$\mu_1$: mean of MST - Civ 2200

$\mu_2$: mean of ST Louis CC - Civ 2200

Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>ST Louis CC - Civ 2200</td>
<td>23</td>
<td>1.96</td>
<td>1.02</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.83</td>
<td>(0.384, 1.276)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

$H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis

$H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.85</td>
<td>23</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 54: The table shows the t-test results for STLCC-Flo Val Calc II and Civ 2200
Two-Sample T-Test and CI: MST - Phy 2, ST Louis CC - Phy 2

Method

\( \mu_1 \): mean of MST - Phy 2
\( \mu_2 \): mean of ST Louis CC - Phy 2

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>ST Louis CC - Phy 2</td>
<td>30</td>
<td>1.87</td>
<td>1.04</td>
<td>0.19</td>
<td></td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.933</td>
<td>(0.541, 1.325)</td>
</tr>
</tbody>
</table>

### Test

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Alternative hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>( H_0: \mu_1 - \mu_2 = 0 )</td>
<td>( H_1: \mu_1 - \mu_2 \neq 0 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.86</td>
<td>30</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 55: The table shows the t-test results for STLCC-Flo Val Calc II and Phys 2135*
APPENDIX 9

Saint Louis University T-test Data

### Two-Sample T-Test and CI: MST - Civ 2210, SLU - Civ 2210

**Method**
- \( \mu_1 \): mean of MST - Civ 2210
- \( \mu_2 \): mean of SLU - Civ 2210
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>SLU - Civ 2210</td>
<td>37</td>
<td>3.189</td>
<td>0.811</td>
<td>0.13</td>
<td></td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.359</td>
<td>(-0.638, -0.079)</td>
</tr>
</tbody>
</table>

**Test**

- **Null hypothesis**: \( H_0: \mu_1 - \mu_2 = 0 \)
- **Alternative hypothesis**: \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.59</td>
<td>41</td>
<td>0.013</td>
</tr>
</tbody>
</table>

*Table 56: The table shows the t-test results for SLU Calc I and Civ 2210*
# Two-Sample T-Test and CI: MST - Civ 2200, SLU - Civ 2200

## Method

- $\mu_1$: mean of MST - Civ 2200
- $\mu_2$: mean of SLU - Civ 2200
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

## Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
</tr>
<tr>
<td>SLU - Civ 2200</td>
<td>32</td>
<td>3.313</td>
<td>0.78</td>
<td>0.14</td>
</tr>
</tbody>
</table>

## Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.561</td>
<td>(-0.848, -0.274)</td>
</tr>
</tbody>
</table>

## Test

- **Null hypothesis**: $H_0: \mu_1 - \mu_2 = 0$
- **Alternative hypothesis**: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.97</td>
<td>34</td>
<td>0</td>
</tr>
</tbody>
</table>

*Table 57: The table shows the t-test results for SLU Calc I and Civ 2200*
Two-Sample T-Test and CI: MST - Physics 2, SLU - Physics 2

Method

μ₁: mean of MST - Physics 2
μ₂: mean of SLU - Physics 2
Difference: μ₁ - μ₂

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>SLU - Physics 2</td>
<td>42</td>
<td>3.333</td>
<td>0.754</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.549</td>
<td>(-0.789, -0.309)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis
H₀: μ₁ - μ₂ = 0

Alternative hypothesis
H₁: μ₁ - μ₂ ≠ 0

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4.61</td>
<td>44</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 58: The table shows the t-test results for SLU Calc I and Phys 2135
## Two-Sample T-Test and CI: MST - Civ 2210, UMSL- Civ 2210

**Method**

- \( \mu_1 \): mean of MST - Civ 2210
- \( \mu_2 \): mean of UMSL- Civ 2210
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.03</td>
</tr>
<tr>
<td>UMSL- Civ 2210</td>
<td>22</td>
<td>2.73</td>
<td>1.03</td>
<td>0.22</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.103</td>
<td>(-0.360, 0.566)</td>
</tr>
</tbody>
</table>

### Test

- Null hypothesis: \( H_0: \mu_1 - \mu_2 = 0 \)
- Alternative hypothesis: \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.46</td>
<td>22</td>
<td>0.648</td>
</tr>
</tbody>
</table>

*Table 59: The table shows the t-test results for UMSL Calc I and Civ 2210*
Two-Sample T-Test and Cl: MST- Civ 2200, UMSL- Civ 2200

Method

- $\mu_1$: mean of MST- Civ 2200
- $\mu_2$: mean of UMSL- Civ 2200
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
<td>2.751</td>
</tr>
<tr>
<td>UMSL- Civ 2200</td>
<td>25</td>
<td>2.64</td>
<td>0.81</td>
<td>0.16</td>
<td>2.64</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.111</td>
<td>(-0.229, 0.451)</td>
</tr>
</tbody>
</table>

Test

- Null hypothesis: $H_0: \mu_1 - \mu_2 = 0$
- Alternative hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.67</td>
<td>25</td>
<td>0.506</td>
</tr>
</tbody>
</table>

*Table 60: The table shows the t-test results for UMSL Calc I and Civ 2200*
Two-Sample T-Test and CI: MST - Physics 2, UMSL - Physics 2

Method

\( \mu_1: \text{mean of MST - Physics 2} \)

\( \mu_2: \text{mean of UMSL - Physics 2} \)

Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>UMSL - Physics 2</td>
<td>38</td>
<td>3.158</td>
<td>0.754</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.374</td>
<td>(-0.626, -0.121)</td>
</tr>
</tbody>
</table>

**Test**

- **Null hypothesis**: \( H_0: \mu_1 - \mu_2 = 0 \)
- **Alternative hypothesis**: \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.99</td>
<td>40</td>
<td>0.005</td>
</tr>
</tbody>
</table>

*Table 61: The table shows the t-test results for UMSL Calc I and Phys 2135*
# APPENDIX 11

## Jefferson College T-test Data

### Two-Sample T-Test and CI: MST - Civ 2210, Jeff Col - Civ 2210

**Method**

- $\mu_1$: mean of MST - Civ 2210
- $\mu_2$: mean of Jeff Col - Civ 2210
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>Jeff Col - Civ 2210</td>
<td>9</td>
<td>2.89</td>
<td>1.17</td>
<td>0.39</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.058</td>
<td>(-0.959, 0.843)</td>
</tr>
</tbody>
</table>

**Test**

Null hypothesis: $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.15</td>
<td>8</td>
<td>0.885</td>
</tr>
</tbody>
</table>

*Table 62: The table shows the t-test results for JeffCo Calc I and Civ 2210*
Two-Sample T-Test and CI: MST- Civ 2200, Jeff Col - Civ 2200

Method

μ₁: mean of MST- Civ 2200
μ₂: mean of Jeff Col - Civ 2200
Difference: μ₁ - μ₂

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST- Civ 2200</td>
<td>917</td>
<td>2.751</td>
<td>0.941</td>
<td>0.031</td>
</tr>
<tr>
<td>Jeff Col - Civ 2200</td>
<td>14</td>
<td>2.643</td>
<td>0.842</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.109</td>
<td>(-0.382, 0.599)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\[ H_0: \mu_1 - \mu_2 = 0 \]

Alternative hypothesis

\[ H_1: \mu_1 - \mu_2 \neq 0 \]

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.48</td>
<td>13</td>
<td>0.641</td>
</tr>
</tbody>
</table>

Table 63: The table shows the t-test results for JeffCo Calc I and Civ 2200
## Two-Sample T-Test and CI: MST - Physics 2, Jeff Col - Physics 2

### Method
- $\mu_1$: mean of MST - Physics 2
- $\mu_2$: mean of Jeff Col - Physics 2
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Physics 2</td>
<td>1442</td>
<td>2.784</td>
<td>0.943</td>
<td>0.025</td>
</tr>
<tr>
<td>Jeff Col - Physics 2</td>
<td>26</td>
<td>2.846</td>
<td>0.925</td>
<td>0.18</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.062</td>
<td>(-0.439, 0.315)</td>
</tr>
</tbody>
</table>

### Test

- **Null hypothesis**: $H_0: \mu_1 - \mu_2 = 0$
- **Alternative hypothesis**: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.34</td>
<td>25</td>
<td>0.738</td>
</tr>
</tbody>
</table>

*Table 64: The table shows the t-test results for JeffCo Calc I and Phys 2135*
# APPENDIX 12

## East Central College T-test Data

### Two-Sample T-Test and CI: MST - Civ 2210, ECC - Civ 2210

**Method**

- \( \mu_1 \): mean of MST - Civ 2210
- \( \mu_2 \): mean of ECC - Civ 2210
- Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

#### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
<td>2.83</td>
</tr>
<tr>
<td>ECC - Civ 2210</td>
<td>25</td>
<td>2.56</td>
<td>1.36</td>
<td>0.27</td>
<td>2.56</td>
</tr>
</tbody>
</table>

#### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.271</td>
<td>(-0.295, 0.836)</td>
</tr>
</tbody>
</table>

#### Test

- **Null hypothesis**
  - \( H_0: \mu_1 - \mu_2 = 0 \)

- **Alternative hypothesis**
  - \( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.99</td>
<td>24</td>
<td>0.333</td>
</tr>
</tbody>
</table>

*Table 65: The table shows the t-test results for ECC Calc II and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, ECC - Civ 2200

Method

- $\mu_1$: mean of MST - Civ 2200
- $\mu_2$: mean of ECC - Civ 2200

Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>ECC - Civ 2200</td>
<td>3</td>
<td>1.33</td>
<td>1.53</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th></th>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.453</td>
<td>(-2.344, 5.250)</td>
</tr>
</tbody>
</table>

Test

- Null hypothesis: $H_0: \mu_1 - \mu_2 = 0$
- Alternative hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.65</td>
<td>2</td>
<td>0.241</td>
</tr>
</tbody>
</table>

*Table 66: The table shows the t-test results for ECC Calc II and Civ 2200*
Two-Sample T-Test and CI: MST - Phy 2, ECC - Phy 2

Method

\( \mu_1 \): mean of MST - Phy 2  
\( \mu_2 \): mean of ECC - Phy 2  
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
<td>0.026</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>ECC - Phy 2</td>
<td>12</td>
<td>2.417</td>
<td>0.793</td>
<td>0.23</td>
<td>0.23</td>
<td>0.793</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.383</td>
<td>(-0.124, 0.890)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis  
\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis  
\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.66</td>
<td>11</td>
<td>0.125</td>
</tr>
</tbody>
</table>

*Table 67: The table shows the t-test results for ECC Calc II and Phys 2135*
**APPENDIX 13**

**Ozark Technical College T-test Data**

**Two-Sample T-Test and CI: MST - Civ 2210, OTC - Civ 2210**

Method

- $\mu_1$: mean of MST - Civ 2210
- $\mu_2$: mean of OTC - Civ 2210
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>OTC - Civ 2210</td>
<td>56</td>
<td>2.696</td>
<td>0.913</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.134</td>
<td>(-0.121, 0.389)</td>
</tr>
</tbody>
</table>

**Test**

- Null hypothesis: $H_0: \mu_1 - \mu_2 = 0$
- Alternative hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.05</td>
<td>65</td>
<td>0.297</td>
</tr>
</tbody>
</table>

*Table 68: The table shows the t-test results for OTC Calc II and Civ 2210*
Two-Sample T-Test and CI: MST - Civ 2200, OTC - Civ 2200

Method

\( \mu_1 \): mean of MST - Civ 2200
\( \mu_2 \): mean of OTC - Civ 2200
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
</tr>
<tr>
<td>OTC - Civ 2200</td>
<td>12</td>
<td>2.417</td>
<td>0.793</td>
<td>0.23</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.37</td>
<td>(-0.139, 0.879)</td>
</tr>
</tbody>
</table>

### Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6</td>
<td>11</td>
<td>0.138</td>
</tr>
</tbody>
</table>

*Table 69: The table shows the t-test results for OTC Calc II and Civ 2200*
Two-Sample T-Test and CI: MST - Phy 2, OTC - Phy 2

Method

\( \mu_1: \) mean of MST - Phy 2
\( \mu_2: \) mean of OTC - Phy 2
Difference: \( \mu_1 - \mu_2 \)

*Equal variances are not assumed for this analysis.*

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>OTC - Phy 2</td>
<td>16</td>
<td>1.94</td>
<td>1.18</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Estimation for Difference**

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.862</td>
<td>(0.230, 1.494)</td>
</tr>
</tbody>
</table>

**Test**

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.91</td>
<td>15</td>
<td>0.011</td>
</tr>
</tbody>
</table>

*Table 70: The table shows the t-test results for OTC Calc II and Phys 2135*
University of North Dakota – Main Campus T-test Data

Two-Sample T-Test and CI: MST - Civ 2210, North Dakota - Civ 2210

Method

μ₁: mean of MST - Civ 2210
μ₂: mean of North Dakota - Civ 2210
Difference: μ₁ - μ₂

Equal variances are not assumed for this analysis.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2210</td>
<td>779</td>
<td>2.83</td>
<td>1.05</td>
<td>0.038</td>
</tr>
<tr>
<td>North Dakota - Civ 2210</td>
<td>16</td>
<td>2.5</td>
<td>0.73</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.331</td>
<td>(-0.065, 0.726)</td>
</tr>
</tbody>
</table>

Test

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>H₀: μ₁ - μ₂ = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative hypothesis</td>
<td>H₁: μ₁ - μ₂ ≠ 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.77</td>
<td>16</td>
<td>0.095</td>
</tr>
</tbody>
</table>

Table 71: The table shows the t-test results for UND Calc II and Civ 2210
Two-Sample T-Test and CI: MST - Civ 2200, North Dakota - Civ 2200

Method

\( \mu_1 \): mean of MST - Civ 2200

\( \mu_2 \): mean of North Dakota - Civ 2200

Difference: \( \mu_1 - \mu_2 \)

(Equal variances are not assumed for this analysis.)

Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Civ 2200</td>
<td>810</td>
<td>2.786</td>
<td>0.934</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>North Dakota - Civ 2200</td>
<td>18</td>
<td>2.33</td>
<td>1.03</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>

Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.453</td>
<td>(-0.063, 0.969)</td>
</tr>
</tbody>
</table>

Test

Null hypothesis

\( H_0: \mu_1 - \mu_2 = 0 \)

Alternative hypothesis

\( H_1: \mu_1 - \mu_2 \neq 0 \)

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.85</td>
<td>17</td>
<td>0.082</td>
</tr>
</tbody>
</table>

*Table 72: The table shows the t-test results for UND Calc II and Civ 2200*
## Two-Sample T-Test and CI: MST - Phy 2, North Dakota - Phy 2

### Method

- $\mu_1$: mean of MST - Phy 2
- $\mu_2$: mean of North Dakota - Phy 2
- Difference: $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST - Phy 2</td>
<td>1297</td>
<td>2.8</td>
<td>0.951</td>
<td>0.026</td>
</tr>
<tr>
<td>North Dakota - Phy 2</td>
<td>31</td>
<td>2.419</td>
<td>0.672</td>
<td>0.12</td>
</tr>
</tbody>
</table>

### Estimation for Difference

<table>
<thead>
<tr>
<th>Difference</th>
<th>95% CI for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.38</td>
<td>(0.129, 0.632)</td>
</tr>
</tbody>
</table>

### Test

- **Null hypothesis**
  
  $H_0: \mu_1 - \mu_2 = 0$

- **Alternative hypothesis**
  
  $H_1: \mu_1 - \mu_2 \neq 0$

<table>
<thead>
<tr>
<th>T-Value</th>
<th>DF</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.08</td>
<td>32</td>
<td>0.004</td>
</tr>
</tbody>
</table>

*Table 73: The table shows the t-test results for UND Calc II and Phys 2135*
Fall 2019 End of 4th Week Enrollment Talking Points

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Enrollment</td>
<td>8,096</td>
<td>8,607</td>
<td>-5.9%</td>
<td>8,884</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>6,462</td>
<td>6,840</td>
<td>-5.6%</td>
<td>6,920</td>
</tr>
<tr>
<td>Graduate</td>
<td>1,634</td>
<td>1,759</td>
<td>-7.1%</td>
<td>1,964</td>
</tr>
<tr>
<td>Female</td>
<td>1,909 (24%)</td>
<td>2,038 (24%)</td>
<td>-6.3%</td>
<td>2,067 (23%)</td>
</tr>
<tr>
<td>On-Campus</td>
<td>7,254</td>
<td>7,744</td>
<td>-6.3%</td>
<td>7,959</td>
</tr>
<tr>
<td>Off-Campus</td>
<td>842</td>
<td>863</td>
<td>-2.4%</td>
<td>915</td>
</tr>
<tr>
<td>Underrepresented Minority</td>
<td>774 (10%)</td>
<td>766 (9%)</td>
<td>1.0%</td>
<td>767 (9%)</td>
</tr>
<tr>
<td>Non-Resident, International</td>
<td>791</td>
<td>890</td>
<td>-11.1%</td>
<td>1,054</td>
</tr>
<tr>
<td>In-State</td>
<td>6,020</td>
<td>6,381</td>
<td>-5.7%</td>
<td>6,417</td>
</tr>
<tr>
<td>Out-of-State</td>
<td>2,076</td>
<td>2,226</td>
<td>-6.7%</td>
<td>2,457</td>
</tr>
<tr>
<td>Total incoming Class</td>
<td>1,430</td>
<td>1,652</td>
<td>-13.4%</td>
<td>1,778</td>
</tr>
<tr>
<td>New Freshman</td>
<td>1,145</td>
<td>1,334</td>
<td>-14.2%</td>
<td>1,426</td>
</tr>
<tr>
<td>New Transfer</td>
<td>285</td>
<td>318</td>
<td>-10.4%</td>
<td>352</td>
</tr>
</tbody>
</table>

All data is from end of fourth week of Fall 2019 semester.

- Incoming freshmen achieved an average ACT score of 28.8, compared to 28.2 in 2018 and 28.0 in 2017. Their average high school GPA is 3.95, compared to 3.88 in 2018 and 3.88 in 2017.
- We continue to increase ethnic diversity and have reached record highs in Asian American, Hispanic, Total Minority, and Under-Represented Minority student populations.
- We see an increase in CASE students growing to 18.8% of the total student population from 2018’s 17.5%. And a decrease in CEC students dropping to 81.2% from 2018’s 82.5%.
- Transfer students make up 20% of the undergraduate new student class, the same as in 2018 and 2017.
- 25.6% of enrolled students are listed as out-of-state residents for tuition purposes. That compares to 25.9% in 2018 and 27.8% in 2017.
APPENDIX D
2018-2019 Meeting Minutes

Meeting Schedule
The Retention Committee meets every other Thursday, from 8:15-9:15 AM in the Silver & Gold room of the Havener Center.

December 13, 2018
Winter Break
February 7, 2019
February 21, 2019
March 7, 2019
April 4, 2019
April 18, 2019
May 2, 2019
June 13, 2019
August 1, 2019
August 29, 2019
September 12, 2019
September 26, 2019
October 10, 2019

November 14, 2018-2019 Presentation to Chancellor Dehghani
December 13, 2018  
8:15 am – 9:15 am  
Havener Center, Silver & Gold Room

**Members:**
*Those whose names are grayed out below were absent.*  
Tim Albers, Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Kate Drowne, John Easter, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Adrienne Neckermann, Dorian Paine, Stephen Raper, Dan Reardon, Anita Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

**Ex Officio Members:**
*Those whose names are grayed out below were absent.*  

**Guest:**  
Amy McMillen

I. **Debrief Presentation to the Chancellor.**
   a. There was good conversation and positive feedback from the chancellor.  
   b. Will schedule two hours for the 2019 presentation if possible.

II. **Subcommittees for the 2019 Presentation**
   a. Graduate Student Experience will continue. Adrienne Neckermann will chair.  
   b. First Year Experience ad hoc committee may continue work as a subcommittee. Chairperson needed.  
   c. Student Intake subcommittee will continue with a focus on communications with admitted freshman students. Tim Albers and Brooke Durbin will co-chair.  
   d. Time to Degree / Credit Hours to Graduation. Chairperson needed.  
   e. Transfer Student Experience will examine data gathered during the 2018 presentation cycle. Erica Long will chair.  
   f. Under Represented Minority Students will continue. Chairperson needed.

III. **Announcements**
   a. Dave Westenberg – An open forum on editing our evolution will be held at 6:30 pm tonight at the Kaleidoscope Discovery Center. Everyone is welcome. Refreshments will be provided.  
   b. Dave Westenberg – The microbiology lunch will be held today at noon in 110 Schrenk Hall.  
   c. Tim Albers – The Advising Council approved last year will begin soon. Tim will work with Provost Marley to determine membership. Those selected will be notified via email.  
   d. Jeff Cawlfield – Commencement is this Saturday.

IV. **Next Meeting (Subcommittee Work Session) – January 24, 2019**  
8:15 am – 9:15 am, Carver Turner Room, Havener Center
Missouri S&T Student Success Committee Meeting  

January 24, 2019  
8:15 am – 9:15 am  
Havener Center, Carver Turner Room  

Members:  
Those whose names are grayed out below were absent.  
Tim Albers, Bridgette Betz, Jeff Cawfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anita Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woelk, Will Zwikelmaier  

Ex Officio Members:  
Those whose names are grayed out below were absent.  

Guest:  
Amy McMillen  

V. Review and Approval of Minutes  
a. Minutes were approved.  

VI. Announcements  
a. Jeff Cawfield – Submit nominations to fill student seat vacated by Alex Cristea.  
b. Jeff Cawfield – Career Fair is February 19.  
c. Patti Fleck – Counseling Services is piloting walk-in hours this semester on Monday, Wednesday, and Friday from 10 am-11 am and on Tuesday and Thursday from 2 pm-3pm.  
d. Lynn Stichnote – The Open House on February 18 overlaps with Show Me S&T, an event for out of state students. We will also host students from the Atlanta University Center, a consortium dual degree engineering program with Morehouse, Spellman, and Clark Atlanta.  
e. John Myers – Engineers Week begins February 18. Activities will include a guest speaker each day.  
f. Adrienne Neckermann – Three Minute Thesis registration closes the end of the week. Presentations will be given to non-specialist audiences. The final competition is open to the public and will be held Thursday, February 7, at 4 pm in the Carver Turner Room.  
g. John Gallagher – Student Body President elections are coming soon. Prior student government experience is not required. Candidates must have 45 credit hours and a 2.75 cumulative GPA.  
h. Will Zwikelmaier – Skip the Line is a new feature at Career Fair. Students can apply online to gain access to a secret entrance and bypass the check-in process.  
i. Tyrone Davidson – The restructuring and merger of Undergraduate Advising and Freshman Engineering Program is underway. The new name is S&T Advising Center.  
j. Anita Rivera – Dinner to Jazz is scheduled for February 23.  
k. Kayla Klossner-Thompson – The first PRO Day is February 23. The first three PRO dates are full.
VII. Finalize Subcommittees and Chairs for the 2019 Presentation
   a. Graduate Student Experience. Adrienne Neckermann will chair.
   b. First Year Experience will not continue work as a subcommittee this presentation cycle.
   c. Student Intake subcommittee. Tim Albers and Brooke Durbin will co-chair.
   d. Time to Degree / Credit Hours to Graduation. Steve Raper will chair.
   e. Transfer Student Experience. Erica Long will chair.
   f. Under Represented Minority Students. Rachel Morris will chair.

VIII. Subcommittee Report Out – Focus for 2019 Presentation Cycle
   a. Graduate Student Experience – Adrienne Neckermann.
      i. Complete and post advisor-advisee expectation documents.
      ii. Contact PhD students who have dropped to learn more about their reasons.
      iii. Training for new members of the Graduate Studies team for enrollment data, time to degree data.
   b. Student Intake subcommittee – Tim Albers.
      i. Collect communications from all units on campus sent to freshmen from time of admission to enrollment.
      ii. Evaluate communications for timeliness and appropriate messaging consistent with university branding standards.
   c. Time to Degree / Credit Hours to Graduation – Steve Raper.
      i. We desire a new 5-year (last 5 academic years (FS 17-18 then back 4 more)) data set and possibly see if we can add first generation info to that.
      ii. Seek to have degree programs review degree audit (DARS) information as it provides much richer and meaningful data to add to the numbers.
      iii. Possible small focus groups of current graduating seniors asking why it took “X” long to graduate.
      iv. Alumni survey was discussed, also to get answers to the above question.
   d. Transfer Student Experience – Erica Long.
      i. Focus on transfer students who are placed on academic probation or have a deficiency.
      ii. Focus on students who leave the university before graduating.
   e. Under Represented Minority Students – Rachel Morris.
      i. Conduct focus groups within the URM community.
      ii. Hold meetings, send questions, conduct surveys.

IX. Next Meeting – February 7, 2019
   8:15 am – 9:15 am, Silver and Gold Room, Havener Center
February 7, 2019  
8:15 am – 9:15 am  
Havener Center, Carver Turner Room  

**Members:**  
*Those whose names are grayed out below were absent.*  
Tim Albers, Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, **John Easter**, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woelk, Lauren Hatfield for Will Zwikelmaier  

**Ex Officio Members:**  
*Those whose names are grayed out below were absent.*  

**Guest:**  
Becky Boggs, Amy McMillen  

**X. Review and Approval of Minutes**  
   a. Minutes were approved.  

**XI. Student Panel**  
   a. Jeff Cawlfield – Seeking nominations for the annual Student Panel on March 7. Send nominations to Donna Luechtefeld.  

**XII. Announcements**  
   a. Lynn Stichnote – The Open House on February 18 overlaps with Show Me S&T, an event for out of state students. We will also host students from the Atlanta University Center, a consortium dual degree engineering program with Morehouse, Spellman, and Clark Atlanta.  
   b. Tyrone Davidson – S&T is hosting the next Academic Advisor Summit on March 15. Details are nearly final. Registration will open soon.  
   c. Tyrone Davidson – Krista Morris-Lehman and Barb Prewitt will present at the Academic Advising Conference on February 11. The topic is comprehensive care.  
   d. John Gallagher – Miner Challenge is holding a pancake breakfast fundraiser on February 16 at the First United Methodist Church from 10 am-2 pm. Proceeds will support the Alternative Break Program.  
   e. Tim Albers – SEM Works consultants will be on campus February 13-15 to begin a comprehensive review of recruitment efforts of undergraduate, graduate, and online students. First recommendations are expected early summer.  

**XIII. Registration and Financial Aid 101**  
   a. Becky Boggs and Katie Tucker presented information about registration and student financial assistance processes and regulations and how changes in registration can affect financial aid eligibility.
XIV. Subcommittee Updates - None
   a. Graduate Student Experience.
   b. Student Intake subcommittee.
   c. Time to Degree / Credit Hours to Graduation.
   d. Transfer Student Experience.
   e. Under Represented Minority Students.

XV. Next Meeting – February 21, 2019
   8:15 am – 9:15 am, Silver and Gold Room, Havener Center
Missouri S&T Student Success Committee Meeting

February 21, 2019
8:15 am – 9:15 am
Havener Center, Carver Turner Room

**Members:**
*Those whose names are grayed out below were absent.*
Tim Albers, Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woelk, Lauren Hatfield for Will Zwikelmaier

**Ex Officio Members:**
*Those whose names are grayed out below were absent.*

**Guest:**
Amy McMillen

XVI. **Review and Approval of Minutes**
   a. Minutes were approved.

XVII. **Student Representatives**
   a. Jeff Cawlfield introduced new student members Quentin Lee and Julia Morgan.

XVIII. **Enrollment Update – Tim Albers**
   a. Enrollment for spring semester is down 3% overall.
   b. Fall-to-spring freshman retention rate is 92.3%.
   c. Highly dependent on in-state for enrollment; however, in-state demographics are shrinking.
   d. In-state Hispanic population growing faster than other populations.
   e. Budget limits out-of-state recruitment.
   f. 34-40% of out-of-state students become Missouri residents within two-three years. This creates a revenue issue.
   g. Spring enrollment of international students is down 4-5% nationally.

XIX. **Subcommittee Updates**
   a. **Graduate Student Experience.**
   b. **Student Intake subcommittee.**
   c. **Time to Degree / Credit Hours to Graduation – Steve Raper**
      i. Accessed seven years of data via Jerry Hammons’ files.
      ii. Manually mined degree audits for 48 students.
      iii. Received good response rate to student survey.
         1. Eleven students graduated in four years. Attribute to personal motivation.
2. Most students had dual enrollment, AP courses, or summer courses.
3. Some students took co-op or internships and classes at the same time.
4. Students who graduated in five-seven years usually experienced some sort of difficulty.
5. Students who graduated in more than seven years usually had one or more stop-outs.

d. Transfer Student Experience – Katie Tucker
   i. Retention data has been compiled for review.
e. Under Represented Minority Students – Rachel Morris
   i. Gathering a list of students to form a cohort to survey.

XX. Announcements
a. Will Zwikelmaier – Career Fair was a success. Attendance was down approximately 10%.
   Employers are still on campus conducting interviews.
b. Jeff Cawlfie – The Student Panel will be held March 7.
c. Kayla Klossner-Thompson – The first PRO will be held Saturday. 170 students expected.
d. Kayla Klossner-Thompson – Family Guide Books are available at pro.mst.edu
e. Dave Westenberg – Biological Sciences will host a public exhibit March 1-17 at the Centre show casing the 1918 Spanish Flu outbreak.
f. Adrienne Neckermann – Faculty judges are need for a poster session that will be held in the rotunda February 24-25.
g. Eddie Grover-Bisker – Applications are open for commencement student speakers. Please encourage students to apply.
h. Anitraz Rivera – Black History Celebration will be held on Friday. Dinner to Jazz, CAC AARR meeting and a PCI event will be held Saturday.
i. Tyrone Davidson – S&T is hosting the next Academic Advisor Summit on March 15. Registration is open.
j. Tim Albers – Junior Science and Humanities Symposium (JSHS) will be held next week at Havener.
k. Lynn Stichnote – The Open House on February 18 overlaps with Show Me S&T, an event for out of state students. We will also host students from the Atlanta University Center, a consortium dual degree engineering program with Morehouse, Spellman, and Clark Atlanta.
l. Patti Fleck – Next week is Mental Health Awareness Week. Counseling will offer “checkups from the neck up.”

XXI. Next Meeting – March 7, 2019 – Student Panel
8:15 am – 9:45 am, Carver Turner Room, Havener Center
Missouri S&T Student Success Committee Meeting  
MINUTES

March 7, 2019  
8:15 am – 9:15 am  
Havener Center, Carver Turner Room

Members:  
Those whose names are grayed out below were absent.  
Tim Albers, Bridgette Betz, Jeff Cavilfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Julia Morgan, Rachel Morris, John Myers, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anita Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woelk, Lauren Hatfield for Will Zwikelmaier

Ex Officio Members:  
Those whose names are grayed out below were absent.  

Guest:  
Amy McMillen

XXII. Review and Approval of Minutes  
a. Minutes were approved.

XXIII. Student Panel  
a. Six students attended the student panel and answered questions asked by committee members. Students will be referred to by their initials.  
   i. BB – Junior in English literature, transfer student, and works in Office of Vice Chancellor of Research.  
   ii. AK – Senior in Engineering Management, minor in psychology. Member of Delta Sigma Phi and Innovation Class through ICOR, Opening Week mentor.  
   iii. JM – Junior in IST/Business, minor in Computer Science, transfer student. TA for Dr. Bates.  
   iv. KK – Junior in chemical engineering and engineering management. Resident assistant last year and PRA this year. Student council vice president, running for president.  
   v. AN – Junior in IST. PRO leader.  
   vi. AS – Majoring in IST and technical communication, participates in track and field, student ambassador, and member of Chi Omega.  
   vii. JW – Majoring in chemical engineering, senior resident assistant, and track team.  

b. Tim Albers – What is your experience with COER?  
   i. AK – I accepted a position with Microsoft through LinkedIn, not on-campus events. I went to COER only my freshmen year, and they assisted me with my resume and some interview questions. I went to career fair each semester.  

c. Tim Albers – Have you done co-ops?
i. JW – I obtained a co-op at Exxon Mobil through NSBE. I used COER.
d. Steve Raper – There is a focus on increasing the four-six year graduation rate. How long do you plan to take to graduate and what factors affect that?
i. AK – It is a mental construct. I always thought of college as a four-year experience. I never thought about extending beyond four years. I planned my entire four years my first semester. I had credit coming in. There was no reason to justify extending, even for another minor.
ii. JM – I started school and then went in the military. Now I am a transfer student. Some credits transferred and some did not. I expect to graduate in the five-year range. I do not feel pressured to rush.
iii. BB – I attended community college for a time. I went a few semesters before attending full time. I changed majors from computer science to English literature.
iv. AN – I changed majors from computer science to IST. I will graduate in 4 ½ years. I could graduate in 4 years if I took 18 hours/semester.
v. AK – I heard of people extending an additional semester to get one more internship or co-op.
vi. JW – I’m considering extending to five years to get another co-op or internship.
vii. KK – I will finish in 5 ½ years. I have a double major and I have done a co-op.
e. Lynn Stichnote – Do you have financial concerns about extending your time to graduation?
i. JW – I have friends who want to go on co-op but would have to drop a sport. Scholarships come into play, also.
ii. AN – Earnings from an internship will help with expenses. Will offset the need for a loan.
iii. KK – I am lucky. I received scholarships through my high school, S&T, and private applications. My dad received a promotion and will be able to help me more.
iv. AS – Taking loans doesn’t make me particularly nervous because I will be able to repay them.
v. BB – Paid internships for English majors are not abundant. I enjoy my current student job on campus working on the department website, newsletters, etc, but it is not what I want to do the rest of my life.
f. Tyrone Davidson – If you are a CASB major, do you feel a sense of belonging among your peers?
i. AN – Sometimes people say, “Oh, well, you’re not an engineer,” but this doesn’t happen often.
ii. BB – Someone wanted to start an art club, and the response was, “Oh, you’re at an engineering school.” Having an interest in art doesn’t mean quantitative science has to be pushed aside.
g. Caprice Moore – What was your introduction to Missouri S&T?
i. AS – My brother played football for S&T.
ii. AK – My brother and dad both attended S&T. I toured, saw the resources, and I received the Chancellor’s Scholarship, which is amazing. I saw this school as an investment.
iii. JW – I came from Texas to run track. I was super hesitant and didn’t really like it, but my mom pushed me. Now I love it! I was determined to meet people, so I joined organizations, took leadership positions, and got involved to meet people.
iv. BB – I lived in Philadelphia and attended online community college. I have family in Springfield, MO and looked at MSU. Coming to Rolla from a big city was a huge adjustment. I did not enjoy my first semester as a computer science major, and I was dubious of an English department on an engineering campus. The English faculty are great.
v. JM – I lived in Waynesville, and wanted a four-year degree. S&T is the only college in the area that offers that degree.
h. Deanne Jackson – What kind of roadblocks have you encountered?
i. AK – A friend and I wanted to participate in a study abroad program not offered through S&T. We wanted to go to Italy and do something non-engineering to augment the humanities. I was going to blow glass, and my friend was going to sketch. We were told that if we leave we would have to forfeit our scholarship and reapply for admission. If S&T wants to be a high caliber institution, they must be more supportive of these types of opportunities. I got a position at Microsoft because of my psychology minor, which has helped me develop an ability to read people.

ii. AN – Some people think you just have to be smart. They don’t appreciate the need to be well-rounded.

i. Donna Luechtefeld – I recently spoke to an alum who was in his late 70s who was on campus for a fraternity event. He told me a story about “weed out courses” during his time as a student here. Do these types of comments and stories from alums, fraternity members, friends, and relatives make an impression on you?
   i. Panel members chuckled and murmured, yes, a lot.
   ii. JW – There is a stigma about the difficulty, but that motivated me to get lots of help.
   iii. AN – Some see it as a challenge. Others back off. I was personally scared to change majors, but found it to be easy. The IST professors are very helpful. The idea of “weed out classes” could be mitigated by promoting options and other majors. Students aren’t stuck in one major.
   iv. KK – Fear is one impact, but worse is not knowing where you are going to end up. This is where career development/advising and identifying your skills can help build confidence.
   v. AS – Many students who were at the top of their high school class are average here. Students need to learn how to reach out to others.
   vi. AK – I learned how to form a study group and work hard. The level of discipline required here is unique. Students need to develop discipline.
   vii. BB – I wonder what it says about the campus culture when fear is such a big motivator compared to curiosity and passion for learning.

j. Amy McMillen – Would it be beneficial for your advisor to reach out to you after your PRO day and before you arrive for Opening Week?
   i. KK – Yes, it would show you care.
   ii. AS – For example, JWV came not knowing anyone and made a conscious effort to meet people. It would especially help students whom are not go-getters make that first connection.

k. Amy McMillen – What is the best way to contact you?
   i. AN – Email is hard because the school account may not be set up yet. Letters home are probably good. I would have liked someone to reach out before I arrived because I was not sure what I wanted and didn’t know what options I had.

l. Lynn Stichnote – What are some barriers and issues for those not academically successful?
   i. AS – Some students are afraid to talk to employers during career fair. Interaction with other students can be a real struggle.
   ii. KK – An activity during PRO day where failure is a likely outcome to help students learn when/how to seek help.
   iii. AN – My roommate dropped out of school. I think the financial and social struggles were too much. I think she just felt lost. It is hard to reach out to these students because it is hard to identify them. Maybe a resource that says, “If you don’t know what’s wrong, go here” would help.
iv. BB – Counseling Services was helpful when I changed majors, but the stigma around counseling prevents many people from seeking assistance.

v. BB – Most classes require internet to access reading material and assignments, but many students don’t have a laptop.

vi. AS – Students could go to a CLC, but that is not convenient.

vii. JW – Students need to engage early on. I took some sort of personality test in one of my English classes. It came with a booklet that told me what I am good at (Strong Campbell?). I thought that was really useful.

m. Kayla Klossner-Thompson – What changes or additions would you make to Opening Week?
   i. AN – I don’t like personality tests because they put you in a box, but I would like a test that shows my learning style and study style.
   ii. BB – Teach students how to learn. There was so much memorization in high school.
   iii. JW – O-week was about making friends. Maybe a deeper connection with your advisor earlier on would be helpful.
   iv. KK – Making connections is important during O-week.
   v. JW – The Student Diversity Scholarship class was a blow-off. It could be really effective if they were serious about it. Focus on psychology, study/learning styles, and soft skills.

n. Erica Long – What is the best way to deliver the right kind of programs and services at the right time to the students who need them? How do we find these students?
   i. AN – Talk to students like us because we have better luck of finding them. Reach out to your regular attendees at meetings and semi-incentivize with things like “bring a friend in order to enter a raffle.”
   ii. BB – Email fatigue is a factor. Counter that with students reaching out to other students. There must be an element of camaraderie – things are not well received if perceived to be pushed down from administration.
   iii. AK – Students don’t attend things when it seems like the same 50 students run everything. I often just chat with Dr. Raper in his office. Need to trick students into being counseled. If it seems official, sometimes it is just awkward. I call the professors I like to talk to “bro-fessors.” Student who are doing well and enjoy their experience can name their professors. Students who are struggling often don't know their professors’ names.
   iv. JW – Maybe have an industry-type focus. When I was on co-op, I had a mentor/guide from day one.

o. Kayla Klossner-Thompson – As a non-traditional student, what was your experience like with support systems?
   i. JM – There are different services available to non-traditional, former-military students. I don’t pay a lot of attention to the traditional student stuff.

p. Tyrone Davidson – Describe your experience with advising.
   i. JM – The Diversity House is a welcoming place. Many students come there from different backgrounds including poverty and first generation, but I see a lot of programs for minority students.
   ii. JW – I hesitated about coming to S&T because I didn’t see people who look like me. That’s why I joined lots of organizations. My sophomore year it was really about academic support, boosting morale and comradery among URM s. I think it is better, but I want to create/continue
that legacy. My freshman year, there were no upper classmen to guide us, mentor us, or represent us. I see progress and appreciate the efforts of others.

iii. AS – I had the same advisor as my brother. He was more helpful for my brother than for me. He always asks me, “Are you sure? You can think about this.” I am sure. I know what I want.

iv. AK – I emailed Dr. Raper that I wanted to switch from chemical engineering to engineering management. In twelve minutes Dr. Raper ran my degree audit and told me which courses would transfer/count for engineering management. He cut through the red tape.

v. AK – I heard that people think engineers can’t communicate, so I joined Toastmasters. Some students need to understand that college is not just about getting a job. It is helpful if the advisor can help identify what skills you have and what kind of work you want to do. We need to be able to articulate that to employers. Some students cannot connect the dots.

q. Katie Tucker – How do we find or reach students who need help identifying their own skill set or developing professional skills such as public speaking or joining Toastmasters?
   i. AN – Students are required to visit their advisor, so we could ask them to take on a more comprehensive role. They could ask about non-academic aspects of a student’s life.
   ii. AS – Help people realize that it takes time to develop skills.
   iii. AK – Still, the best way to reach students is through other students.

r. Katie Tucker – Is there an undue burden placed on students if we rely on them to help us reach other students?
   i. JW – I can make the leadership role authentic, let students know I’ve been there, struggled, and sought assistance.
   ii. AS – Perhaps if more students learned more soft skills, they could help other students connect and reach out to each other earlier on.
   iii. AK – I don’t think it is a burden. Sometimes I feel guilty that I made it but I’m not sure I know how to help others.

XXIV. Announcements
   a. John Gallagher – Miner Challenge will host a Trivia Night fundraiser on March 8.
   b. Brooke Durbin – FIRST Robotics competition will be held Saturday at Gale Bullman Student Recreation Center.

XXV. Next Meeting – April 4, 2019
     8:15 am – 9:15 am, Silver and Gold Room, Havener Center
April 4, 2019
8:15 am – 9:15 am
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Tim Albers, Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woeck, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.

Guest:
Amy McMillen

XXVI. Review and Approval of Minutes
   a. Minutes were approved.

XXVII. Debrief Student Panel – Comments and Suggestions to Improve Future Panels.
   a. Katie Tucker – Would like to hear more from students who are struggling.
   b. Lynn Stichnote – Perhaps we could invite only students who are struggling.
   c. Kayla Klossner-Thompson – Release the questions prior to the event so the students would have time to prepare.
   d. Tim Albers – We may need to guide questions in a particular direction.
   e. Donna Luechtefeld – We could focus the questions on the subcommittee topics.
   f. Dan Reardon – Prepared questions are a good idea. It may be difficult to reach struggling students. It seems like we already know the answers to the questions we ask.
   g. Donna Luechtefeld – Consider if there is a better time of year to hold the student panel.
   h. Donna Luechtefeld – Consider other room arrangements that may feel less intimidating. For example, circle seating without tables or a closed square instead of a separate table for the panel.
   i. Donna Luechtefeld – Consider seating the student committee members with the student panel.
   j. John Gallagher – Consider holding panel discussions within each subcommittee as opposed to one panel in front of the entire committee.
   k. Dan Reardon – Seek nominations through departments.
   l. Dorie Paine – We need to decide in advance what we want to know, what information we want to gather from the students.
m. Unknown – Consider rephrasing the questions to move the focus from the student panel member to a friend or someone they know.

n. Unknown – Consider rephrasing the questions to shift the focus to S&T. For example, how well does S&T deliver a particular service?

XXVIII. SEM Works Overview

a. Tim Albers gave an overview of the SEM Works recruitment and enrollment analysis currently in progress.

b. Four strategic opportunities were identified and teams were formed with representation from a variety of units campus-wide.
   i. Slate Lead Generation. Brooke Durbin is the team lead.
   ii. Website Enhancement. Cheryl McKay is the team lead.
   iii. Diversified Enrollment Portfolio. Bill Elliott is the team lead.
   iv. Performance Management. Lynn Stichnote is the team lead.

XXIX. Committee Timeline – Donna Luechtefeld

a. Summer meeting dates are set for June 13, July 11, and August 1.

b. Regular semester meetings resume August 29.

XXX. Subcommittee Updates

a. Graduate Student Experience – No update.

b. Student Intake subcommittee – No update.

c. Time to Degree / Credit Hours to Graduation – Steve Raper
   i. IT will calculate data on degree audits.
   ii. Will ask CEC and CASB deans to contact graduating students about how they completed their degree in four years.
   iii. Conducting literature search for strategies, etc, but have not found anything we are not currently doing.

d. Transfer Student Experience – No update.

e. Under Represented Minority Students – Bridgette Betz
   i. Subcommittee has a list of 500 students. Plan to send a short survey and invitation to a focus group before the end of the semester.
   ii. Subcommittee has a list of students not currently enrolled. Plan to contact them for information about their experience.

XXXI. Announcements

a. Quentin Lee – S&T took fourth place in disc golf championships.

b. Tim Albers – 125 students are registered for Open House on Friday.

c. Dan Reardon – There are still tickets available for Newsies. There are three more performances.

d. Lynn Stichnote – There will not be an Open House on Good Friday this year.

XXXII. Next Meeting – April 18, 2019

8:15 am – 9:15 am, Silver and Gold Room, Havener Center
Missouri S&T Student Success Committee Meeting

April 18, 2019
8:15 am – 9:15 am
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Tim Albers, Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Mike Pleimann for Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Lynn Stichnote, Dave Westenbe, Klaus Woelk, Lauren Hatfield for Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.

Guest:
Amy McMillen

XXXIII. Review and Approval of Minutes
a. Approval of April 4 Minutes Postponed to May 2.

XXXIV. Debrief HLC Meeting.
   a. Jeff Cawlfield attended sessions on student success.
      i. Annie McKee gave the keynote address. She spoke about happiness and what makes staff and students happy at work and school. First generation students are particularly susceptible to happiness traps.
      ii. Military veterans and dependents have special issues.
      iii. Provost at IUPUI presented data on first to second year retention.
           1. Controlling for all other factors, students employed on campus experience a 7% increase in retention.
           2. Students with unmet financial need often decline subsidized student loans and take jobs off campus instead, especially first generation students, whose families are afraid of loans and debt.
   b. Caprice Moore attended sessions on distance learning, recruitment, instruction, and evaluation.
      i. Students want to connect with their instructors, and this connection is a main avenue of student success.
      ii. The admissions scandal at USC impacts higher education in general in that it provides an opportunity for all institutions to review their practices.
      iii. Economic and political impact of transitions in higher education.
           1. Are free tuition models sustainable?
2. Greater numbers of students are taking advantage of trade schools and certificate programs.

XXXV. Housing Update
   a. Dorie Paine reviewed changes to housing requirements policy.
      i. Student must complete 60 hours post high school graduation to be exempt from the residency requirement. The former policy stated 60 hours of college coursework, which could have included hours completed prior to high school graduation.
      ii. The number of hours to qualify for an academic exception has increased from 30 to 32 hours of full-time academic work over two consecutive semesters. The criteria are set to accommodate exemplary students, and are intended to be an exception.
      iii. Quentin Lee expressed concern that the academic exception requirements are nearly impossible to achieve thereby creating a financial hardship for students.
      iv. Klaus Woelk – The two-year requirement is intended to ensure students get connected and engaged.
   v. Amy McMillen – Are students grandfathered in under the old policy?
   vi. Dorie Paine – Students may be grandfathered in on a case-by-case basis.
   vii. Klaus Woelk – Does research support the benefits of on-campus housing?
   viii. Dorie Paine – There is very strong research to support first year residency requirements both at S&T and nationally.
   ix. Jeff Cawfield – Students were on the committee to review and revise the campus housing requirements.
   x. Julia Morgan – Expressed concern that committee members were brushing over or dismissing the comments.
   xi. John Myers – Policies are created with students’ best interest in mind.

XXXVI. Opening Week 2019 Update – Mike Pleimann
   a. Academic workshops sessions will begin Monday morning. This will allow for better processing of test results, and should improve the student experience.
   b. A national speaker has been invited to augment the Miner Values program that will be presented Monday afternoon.
   c. Math study sessions will be hosted by LEAD will be held at various locations across campus.

XXXVII. Subcommittee Updates Subcommittee Updates
   a. Graduate Student Experience – Steve Raper
      i. Met with IT staff.
      ii. Reports are nearly complete.
   b. Student Intake subcommittee – Tim Albers
      i. This committee has suspended their work due to duplication of efforts with the SEM Works project. There will be no report for the 2019 Presentation to the Chancellor.
   c. Time to Degree / Credit Hours to Graduation – No update.
   d. Transfer Student Experience – Erica Long
      i. Data has been collected and is ready for subcommittee review.
   e. Under Represented Minority Students – Rachel Morris
      i. Developed survey questions to focus on factors of student success.
      ii. Will send survey before end of semester.
      iii. Plan to hold focus group at the beginning of the fall semester.
XXXVIII. Announcements

a. Lynn Stichnote – Distributed a schedule of Special Events and Open House dates for 2019-2010.

b. Lynn Stichnote – Provost Marley approved a one-year contract with Platform Q to help Admissions develop and produce live webcasts. Other campus groups may also use this service to create webcasts for their events.

c. Jeff Cawlfield – There will be three commencement ceremonies in May.

d. Tim Albers – There are 125 students registered for Discover Day tomorrow.

e. Jeff Cawlfield – Transfer Advising Day is today.

f. Deanne Jackson – Fall registration is down 3% overall. Summer registration is up 0.7%.

g. Deanne Jackson – The civics exam will be required for new freshmen and transfer students with the Fall 2019 catalog year. Students may complete the exam through Canvas after July 1.

h. Deanne Jackson – The waitlist process has change and will be fully automated. Students will be skipped if a waitlisted class does not fit their schedule, but will remain on the waitlist. Students will be notified electronically that some action is required.

i. Julia Morgan – How will students be notified of the change in process? Will this be published somewhere?

j. Deanne Jackson – The Student Council president will distribute information and the information on the website will be updated.

XXXIX. Next Meeting – May 2, 2019

8:15 am – 9:15 am, Silver and Gold Room, Havener Center
May 2, 2019  
8:15 am – 9:15 am  
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Tim Albers, Bridgette Betz, Jeff Cawfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Lynn Stichnote, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.

Guest:
Amy McMillen

XL. Review and Approval of Minutes
   a. April 4 and April 18 minutes were approved.

XLI. FYRE Showcase
   a. Committee members visited the First Year Research Experience showcase in the Havener Atrium.

XLII. Subcommittee Updates

Subcommittee Updates
   a. Graduate Student Experience – Adrienne Neckermann
      i. Subcommittee is reviewing materials.
   b. Student Intake subcommittee – Suspended for 2019 presentation cycle.
   c. Time to Degree / Credit Hours to Graduation – Steve Raper
      i. Received replicates of files from last study from IT.
      ii. Receiving feedback from survey sent from department to May 2019 graduating seniors who completed their degree in four years.
      iii. Would like to conduct a more sophisticated literature review.
   d. Transfer Student Experience – Erica Long
      i. Data has been collected and is ready for subcommittee review.
   e. Under Represented Minority Students – Rachel Morris
      i. Survey is almost ready to disburse.
      ii. Final survey item is an invitation to participate in a focus group to be held at the beginning of the fall semester.

XLIII. Announcements
a. Will Zwikelmaier – COER will host a new event on the Puck Mall the night before the fall career fair. The concept is a reverse career fair. Employers will visit with students at tables featuring their team or organization. 500-700 employer representatives are expected.

b. Kayla Klossner-Thompson – There will be only three PRO days in June. The June 28th PRO day is cancelled due to low registration.

c. Bridgette Betz – Student Financial Assistance is working on summer aid awards.

d. John Gallagher – Fraternity and sorority leaders have mandated anti-hazing training for all students joining a chapter next fall.

e. John Gallagher – Registration is open for a table at Miner Rama.

XLIV. General Items – Provost Marley

a. Provost Marley thanked members for their work on this committee. It is important work, and decisions must be data driven.

b. A proposal to rebuild the IR function is in development. Focus is analytics assessment.

c. The incoming freshman class is the strongest ever, but the retention and graduation rates are similar to those of an open admission institution.

d. President Choi is focused heavily on the strategic plan. It will be important to reflect on what we are doing structurally to support students to improve retention and graduation rates. President Choi will want S&T to reach the retention and graduation rate goals.

e. We need to be upfront about the need for change, which led to the difficult decision for change in Enrollment Management. We need to change how we are doing business and will talk more with Enrollment Management staff about this.

f. Will recommend Paul Orscheln continue the Advising Council.

g. Many issues appear to revolve around a lack of coordination. Many groups on campus are working on things, but not together.

h. Staff at UM System read the strategic plan daily and believe in the one-solution fix for the retention and graduation rates problem.

i. Jeff Cawlfield thanked the provost and chancellor for their support of this committee.

XLV. Next Meeting – TBD

8:15 am – 9:15 am, Silver and Gold Room, Havener Center
Members:  
Those whose names are grayed out below were absent.
Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Kate Drowne, Brooke Durbin, John Easter, Patti Fleck, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Quentin Lee, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anita Rivera, Paul Runnion, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

Ex Officio Members:  
Those whose names are grayed out below were absent.

Guest:  
Amy McMillen

XLVI. Review and Approval of Minutes  
a. Minutes were approved.

XLVII. Announcements  
a. Brooke Durbin – Will assist as co-chair of the Student Success Committee for the foreseeable future as Acting Vice Provost for Enrollment Management.

b. Kayla Klossner-Thompson – 112 students are expected for PRO Day on June 14 and 35 students are expected for PRO Day on June 21.

c. Brooke Durbin – Articulation agreements were signed with the St. Louis College of Pharmacy for 3+4 and 4+4 agreements.

d. Will Zwikelmaier – COER tested a new process for Career Fair that will get 300 students checked in every five minutes compared to 35 students every five minutes with the previous process. This will reduce the number of volunteers needed from 100+ to approximately 40.

e. Adrienne Neckermann – Will offer 4 separate 2-hour sessions for Graduate Student Orientation followed by a reception.

f. Bridgette Betz – The 2019-2010 Cost of Attendance has been approved and released.

XLVIII. Subcommittee Updates  
a. Graduate Student Experience – Adrienne Neckermann
   i. Subcommittee is meeting regularly.

b. Student Intake subcommittee – Suspended for 2019 presentation cycle.

c. Time to Degree / Credit Hours to Graduation – Donna Luechtefeld for Steve Raper
   i. Waiting for one more set of reports from IT.
ii. Conducting a literature review.
iii. Almost ready to begin writing report.
iv. John Myers - 65 graduating undergraduate CEC students completed a short survey at the end of spring semester. 24 students graduated in four years or less, 36 students graduated in 4.5 or 5 years, 3 students graduated in 6 years and 2 students graduated in 7 years. Plan to survey all graduating undergraduate students in the fall.
d. Transfer Student Experience – Erica Long
   i. Brief review of data did not show expected results. Will discuss and review further with subcommittee.
e. Under Represented Minority Students – Donna Luechtefeld for Rachel Morris
   i. Received good results from survey.
   ii. Enough students expressed interest in participating in a focus group, so will conduct one at the beginning of the fall semester.

XLIX. Announcements
   a. Will Zwikelmaier – COER will host a new event on the Puck Mall the night before the fall career fair. The concept is a reverse career fair. Employers will visit with students at tables featuring their team or organization. 500-700 employer representatives are expected.
   b. Kayla Klossner-Thompson – There will be only three PRO days in June. The June 28th PRO day is cancelled due to low registration.
   c. Bridgette Betz – Student Financial Assistance is working on summer aid awards.
   d. John Gallagher – Fraternity and sorority leaders have mandated anti-hazing training for all students joining a chapter next fall
   e. John Gallagher – Registration is open for a table at Miner Rama.

L. Next Meeting August 1, 2019
   8:15 am – 9:15 am, Silver and Gold Room, Havener Center
August 1, 2019
8:15 am – 9:15 am
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Brooke Durbin, John Easter, Patti Fleck, Shannon Fogg, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Quentin Lee, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Cathy Tipton, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.
Joni Burch, Kate Drowne, Erica Long, Donna Luechtefeld, Beth Cudney for Caprice Moore, Stephen Roberts, Katie Tucker, Richard Wlezien

LI. Review and Approval of Minutes
   a. Minutes were approved.

LII. Update on APLU Tech Cluster Initiative – Jeff Cawlfield
   a. APLU's Powered by Publics initiative is comprised of 130 institutions organized into 16 Transformation Clusters focused on improving access, retention, and graduation.
   b. S&T belongs to the Tech Cluster. Other members in this cluster are Michigan Technological University, New Jersey Institute of Technology, University of Alabama in Huntsville.
   c. The Tech Cluster focus is on holistic advising. Members meet monthly via Zoom to exchange ideas and best practices and to develop new strategies.
   f. Steve Roberts made the following comments regarding student success.
      i. S&T's graduation and retention rates are similar to national averages but not to similar cohorts at other universities.
      iii. S&T will look at DFW rates per course to identify courses people believe are a problem, but are actually fine and problematic courses that people believe are fine.
iv. Anticipate many projects and/or studies related to Student Success over the next year to improve success rates. This committee will participate.

v. Need to identify/develop new strategies to improve student success such as a lecture capture process like the one CASB recently made available to all students.

vi. UM System to release a data set for retention and graduation rates by department.

g. Subcommittee reports and the Strategic Plan – Jeff Cawlfield

i. It will be important to reference the Strategic Plan in subcommittee reports where possible. Work for the next cycle will need to be based on the Plan.

ii. Donna Luechtefeld suggested reviewing the Strategic Plan during a committee meeting. Members agreed this will be useful.

LIII. Committee Timeline – Rachel Morris

- September 30: Subcommittee Reports and Power Point Slides to Rachel
- October 4: Rachel to Send Draft Report to Committee
- October 10: Subcommittee Presentations to the Committee
- October 17: Edits Due to Rachel
- October 24: Subcommittee Presentations to the Committee
- October 24: Final Report Complete
- November 7: Presentation to the Chancellor

LIV. Subcommittee Updates

a. Graduate Student Experience – Adrienne Neckermann

i. Creating an Advisor-Advisee guide to cover things such as faculty and student roles.

ii. Creating a Graduate Student Success guide to cover things such as housing, what to do if your advisor leaves, what to do if funding runs out.

b. Student Intake subcommittee – Suspended for 2019 presentation cycle.

c. Time to Degree / Credit Hours to Graduation – Steve Raper

i. Subcommittee report is nearly complete.

ii. Time to degree is 5 years on average. Students consider S&T a “5-year university”.

iii. CASB students have 140 hours on average at graduation. CEC students have 145-146 hours on average at graduation.

iv. Small literature review highlighted the importance of data analytics.

v. Retention/Graduation Rates may need to be a stand-alone committee separate from the Student Success Committee.

vi. Missing data piece may be what students think or feel. An example from the most recent Student Panel: A student said, “College is four years. I never considered anything else.”

vii. Steve Roberts made the following comments.

1. The Teacher Education Program received intense scrutiny from MDHE for the number of hours to certification. MDHE likely to review more programs. Anticipate they will question how other STEM programs graduate students in 120-125 hours compared to 140-145 hours at S&T.

2. S&T will set up an IR platform.

d. Transfer Student Experience – Erica Long

i. Data did not show expected results. Transfer student success rates are similar to overall campus rates. Will review data by college, department, major, etc.

e. Under Represented Minority Students – Rachel Morris
i. 15 students expressed interest in participating in a focus group.
ii. In process of scheduling that event.

LV. Announcements
   a. Jeff Cawlfield – The Academic Affairs Retreat will be held August 7-8. Agenda includes barriers, challenges and strategies to student success. Please send comments or suggestions for consideration during the retreat to Donna Luechtefeld.
   b. Deanne Jackson – Changes have been made to the refund policy and the add/drop policy.
   c. Will Zwikelmaier – UMKC will allow S&T business, engineering, and computing students to attend their career fair. Mizzou will allow S&T biological science students to attend their career fair. Only S&T students will be allowed to attend the S&T career fair, per agreements with employers.
   d. Doug Ludlow – S&T Advising is moving to G-6 library today.
   e. Kayla Klossner-Thompson – 1,172 freshman are expected. This includes the August PRO.
   f. John Gallagher – Reserve your table for Miner Rama.
   g. John Gallagher – Miner Challenge advisor application is open now.

LVI. Next Meeting – August 29, 2019
   8:15 am – 9:15 am, Silver and Gold Room, Havener Center
Members:
Those whose names are grayed out below were absent.
Bridgette Betz, Jeff Cawlfield, Tyrone Davidson, Brooke Durbin, Patti Fleck, Shannon Fogg, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Quentin Lee, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Cathy Tipton, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.

LVII.  Review and Approval of Minutes
a. Minutes were approved.

LVIII.  Enrollment Update – Brooke Durbin
a. A Trends Report is generated at the end of each week of class until fourth week when numbers are official.
b. Record enrollment was set for Asian-Americans, Hispanic-Americans, total minority, non-Caucasian, and under-represented minority students.
c. Total enrollment is down 5.1%.
d. Undergraduate enrollment is down 5.4%.
e. Graduate enrollment is down 4.2%.
f. Female enrollment is down 5.2%.
g. On-campus enrollment is down 6%.
h. Off-campus enrollment is up 3.4%.
i. First time college is down 13.9%.
j. Transfer enrollment is down 10%.
k. CASB enrollment is 18.8% compared to 17.4% last year.
l. CEC enrollment is 81.2% compared to 82.6% last year.
m. Record high average high school GPA of 3.95.
n. Record high average ACT score of 28.8.

LIX.  EAB Update – Brooke Durbin
a. Three-year contract to assist with recruiting efforts. Will work with Marketing and Communications, Recruitment Marketing & Enrollment Development, and Admissions.
b. EAB will conduct a communications campaign to increase the number of applications beginning with the Fall 2020 class via a quick application unique to S&T called the Groundbreaker Application.
c. EAB will assist with communications to increase brand awareness among high school sophomores and juniors. The campaign phrase/tagline is “Cultivate your curiosity. Choose a college that expands your mind.”

d. EAB will deliver scholarship optimization services previously provided by Ruffalo Noel Levitz.
e. Site visits will be held to identify ways to optimize strategies.

LX. **Student Success Compact of the Strategic Plan**
   a. Jeff Cawlfield reviewed key points in the student success compact of the strategic plan.

LXI. **Subcommittee Updates**
   **Subcommittee Updates**
   a. Graduate Student Experience – Adrienne Neckermann
      i. Rough draft of report is complete.
      ii. Draft of Advisor-Advisee Guiding Principles is complete.
   b. Student Intake subcommittee – Suspended for 2019 presentation cycle.
   c. Time to Degree / Credit Hours to Graduation – No update.
   d. Transfer Student Experience – Erica Long
      i. Working on report.
   e. Under Represented Minority Students – Rachel Morris
      i. Three students participated in the focus group.
      ii. Students would like to meet on a regular basis.
      iii. Plan to send focus group questions to students who expressed interest but did not attend.

LXII. **Announcements**
   a. Jeff Cawlfield – Welcomed Christina Carrig to the Student Success Committee as the Student Council representative. She is currently the Student Council vice president of external affairs and serves as an On-Track Mentor for Academic Advising.
   b. Doug Ludlow – Student Advising moved to G-6 Library. Approximately 80-90 students and many staff visited during open house which was held Tuesday and Wednesday.
   c. John Gallagher – Thank you to Dave Westenberg for video content used to promote Miner Challenge. Please submit an application to serve as faculty/staff advisor if interested. The application closes soon.
   d. Will Zwikelmaier – There is a wait list for employers to attend career fair. Miner Mingle is a new event set to take place the night before. It will be followed by Night to Network.
   e. Will Zwikelmaier – A top employer of S&T students is including a clause in the offer of employment indicating an employee can be dismissed due to parent complaints regarding work schedule/work load.
   f. Kayla Klossner-Thompson – Thank you to everyone who participated in Opening Week activities.
   g. Erica Long – A new advisor started on Monday. She will focus on the Missouri State Co-Op Program with approximate 25 students and ABET assessment items.
   h. Anitra Rivera – All are welcome to attend the What’s Cookin’ for Breakfast event at the SDI House on September 4 from 8:30-11:00 am.
   i. Adrienne Neckermann – Number of attendees at Graduate Student Orientation was higher than last year. Events included a graduate student research fair and a graduate-faculty social.
   j. Adrienne Neckermann – Graduate Students and Global Learning will trade spaces in Norwood and Centennial next week.
k. Bridgette Betz – There will be changes to the Fall 2020 scholarships due to the transition from Ruffalo Noel Levitz to EAB. Will roll our simpler, easier to advertise scholarships connected to the Groundbreaker application.

LXIII. Next Meeting – September 12, 2019
8:15 am – 9:15 am, Silver and Gold Room, Havener Center
Missouri S&T Student Success Committee Meeting

September 12, 2019
8:15 am – 9:15 am
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Bridgette Betz, Christina Carrig, Jeff Cawlfield, Tyrone Davidson, Brooke Durbin, Patti Fleck, Shannon Fogg, John Gallagher, Eddie Grover-Biker, Deanne Jackson, Kayla Klossner-Thompson, Quentin Lee, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anita Rivera, Paul Runnion, Cathy Tipton, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.
Joni Burch, Kate Drowne, Erica Long, Donna Luechtefeld, Caprice Moore, Stephen Roberts, Katie Tucker, Costas Tsatsoulis, Richard Wlezien

LXIV. Review and Approval of Minutes
a. Minutes were approved.

LXV. Academic Care Teams
b. The S&T care coordinator worked with 808 students last year, many for mainly academic reasons such as absenteeism, unresponsive to email, low motivation, unaware of how or where to seek help, etc.
c. Missouri State University (MSU) implemented an Academic Care Team to coordinate interventions and support for students with primarily academic concerns.
d. The S&T care coordinators would like to explore interest in implementing an Academic Care Team at Missouri S&T to help coordinate the efforts of many people working with the same student.
e. Jeff Cawlfield will contact the Academic Care Team leader at MSU for more information about their program and report to the committee.

LXVI. Student Emergency Fund
b. Counseling Services established the fund three years ago.
c. There is a 93% retention rate for students who receive funding.
d. Provides one-time funding of $25-$500 to students in dire need. Funds do not have to be repaid.
e. It is funded solely through donations and fundraisers. Go to giving.mst.edu or contact Krista Morris-Lehman to make a donation.
f. Students can be referred to the Emergency Fund by calling Counseling Services at 341-4211, emailing cc@mst.edu or online at https://counseling.mst.edu/emergency-fund/
g. Deanne Jackson said there will be a Fudge Off and Sweet Treats competition on November 5 from 11 am – 2 pm to benefit the fund.

LXVII. Subcommittee Updates

Subcommittee Updates

a. Graduate Student Experience – Patti Fleck
   i. Drafting a Discussion Guide for graduate students and advisors to have a conversation about expectations.
   ii. Generating a plan of when, how, and to whom to disseminate.
   iii. Working on our report.

b. Student Intake subcommittee – Suspended for 2019 presentation cycle.

c. Time to Degree / Credit Hours to Graduation – Donna Luechtefeld for Steve Raper
   i. Finishing subcommittee report and working on PPT slides.

d. Transfer Student Experience – No update.

e. Under Represented Minority Students – Rachel Morris
   i. Writing subcommittee report.
   ii. Students in focus group would like to meet on a regular basis. Looking for a date.

LXVIII. Announcements

a. Patti Fleck – Counseling Services with feedback from several student groups created refrigerator magnets with contact information for mental health and well-being resources. Distributing magnets through Residential Life, Greek Life, and “Let’s Talk” tables in various locations such as Havener and the library.

b. Dave Westenberg – The volleyball team was undefeated last weekend. There is a football game on Saturday at 7 pm. Chancellor Dehghani and his family will be introduced at halftime. Admission is free for all faculty and staff. The All Star game will be next weekend.

c. Brooke Durbin – Final enrollment for Fall semester will be reported next Tuesday.

d. Christina Carrig – Student Council will host an open forum to discuss academic advising on November 6. All are welcome to attend.

e. Patti Fleck – Tuesday was World Suicide Prevention Day. Ask Listen Refer is a suicide prevention training program available at http://www.asklistenrefer.org/mst. It takes approximately 30 minutes to complete.

LXIX. Next Meeting – September 26, 2019

8:15 am – 9:15 am, Silver and Gold Room, Havener Center
Missouri S&T Student Success Committee Meeting

September 26, 2019
8:15 am – 9:15 am
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Bridgette Betz, Christina Carrig, Jeff Cawfield, Tyrone Davidson, Brooke Durbin, Patti Fleck, Shannon Fogg, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Quentin Lee, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Cathy Tipton, Dave Westenber. Klaus Woelk, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.
Joni Burch, Kate Drowne, Erica Long, Donna Luechtefeld, Caprice Moore, Stephen Roberts, Costas Tsatsoulis, Katie Tucker, Richard Wlezien

Guest:
Amy McMillen

LXX. Review and Approval of Minutes
   a. Minutes were approved.

LXXI. Overview of Fourth Week Enrollment Numbers
   a. Brooke Durbin presented enrollment data.
   b. Total enrollment is 8,096, down 5.9% from 2018.
   c. Record enrollment set for the following minority groups: 318 Asian students, 341 Hispanic students, 774 under-represented minority students, 1,200 total minority students.
   d. International student enrollment is 791, down 11% from 2018.
   e. The largest number of students are from Missouri, Illinois, Texas, California, Kansas, and Oklahoma.
   f. The largest number of Missouri students come from the St. Louis area, Jackson County, Phelps County, and Greene County.
   g. The largest number of freshmen come from the St. Louis area and Kansas City area and Illinois.
   h. The Competitor Chart is updated annually by running the Admitted Not Enrolled survey data against the National Student Clearing House. Mizzou is still our top competitor.

LXXII. Retention and Graduation Numbers as Related to U.S. News and World Report Rankings
   a. Jeff Cawfield reviewed criteria considered in rankings.
   b. Retention and graduation rates affect rankings. We can improve S&T’s rank by changing the culture of pride in low graduation rates.
   c. 6-year graduation rates of 63-64% need to be increased to 70% to reach goal range.
   d. Pell 6-year graduation rates of 50-59% need to be increased to 60% or greater to reach the goal range.
e. There is an inverse relationship between acceptance rates and school rankings. Lower acceptance rates result in higher rankings.

LXXIII. APLU Technical Cluster Stretch Goals for S&T
a. Jeff Cawlfield presented the draft stretch goals for S&T.
b. Increase the number of BA and BS degrees awarded.
c. Increase total undergraduate enrollment to 7,250.
d. Increase total URM enrollment to 1,000.
e. Increase 6-year graduation rate to 70% for general student body.
f. Increase 6-year graduation rate to 60% for URM students.

LXXIV. S&T Retention Plan
a. Chancellor Dehghani has requested a retention plan. Jeff Cawlfield is creating a draft and will submit it to Provost Roberts for review.

LXXV. Subcommittee Updates
a. Graduate Student Experience – Adrienne Neckermann
   i. The subcommittee is meeting this afternoon.
b. Student Intake subcommittee – Suspended for 2019 presentation cycle.
c. Time to Degree / Credit Hours to Graduation – Steve Raper
   i. Working on PPT slides.
d. Transfer Student Experience – Erica Long
   i. Drafting the report with subcommittee.
e. Under Represented Minority Students – Rachel Morris
   i. Will send report to subcommittee next week.

LXXVI. Announcements
a. Will Zwikelmaier – 3,500 students attended Career Fair. There were a record number of employers. Received good feedback on the Miner Mingle event. Career Fair dates are now included on the Academic Calendar.
b. Doug Ludlow – 504 students moved to their degree major as of Monday, September 23.
c. Klaus Woelk – The Teaching and Technology Conference will be held in St. Louis today and tomorrow. There is no fee to attend.
d. Brooke Durbin – S&T has partnered with EdSights in a one-year pilot program aimed at improving freshman to sophomore retention rates. The initial survey focusing on academics, engagement, financial concerns, and wellness received a 60% response rate. 92% of respondents opted in to receive text messages. Only 6 students opted out after the text messages began.
e. Dorie Paine – Interventions are launched based on survey responses.
f. Tyrone Davidson – The Advising Office staff will contact 21 students identified as high risk.
g. Completing the initial round of reporting. There is a 60% response rate on the survey.
h. Jeff Cawlfield – Provost Roberts will purchase the Predictive Analytics module of Starfish.

LXXVII. Next Meeting – October 10, 2019
8:15 am – 9:15 am, Silver and Gold Room, Havener Center
October 10, 2019
8:15 am – 9:15 am
Havener Center, Silver and Gold Room

Members:
Those whose names are grayed out below were absent.
Bridgette Betz, Christina Carrig, Jeff Caw菲尔d, Tyrone Davidson, Brooke Durbin, Patti Fleck, Shannon Fogg, John Gallagher, Eddie Grover-Bisker, Deanne Jackson, Kayla Klossner-Thompson, Quentin Lee, Douglas Ludlow, Rachel Morris, John Myers, Julia Morgan, Adrienne Neckermann, Dorie Paine, Stephen Raper, Dan Reardon, Anitra Rivera, Paul Runnion, Shobi Sivadasan, Cathy Tipton, Dave Westenberg, Klaus Woelk, Will Zwikelmaier

Ex Officio Members:
Those whose names are grayed out below were absent.
Joni Burch, Kate Drowne, Erica Long, Donna Luechtefeld, Caprice Moore, Stephen Roberts, Costas Tsatsoulis, Katie Tucker, Richard Wlezien

Guest:
Amy McMillen

LXXVIII. Review and Approval of Minutes
   a. Minutes were approved.

LXXIX. Shobi Sivadasan and Committee Introductions
   a. Shobi Sivadasan, the new Vice Provost for Enrollment Management, began her duties on October 1. She and committee members introduced themselves.

LXXX. Transfer Student Engagement Subcommittee Presentation
   a. Erica Long presented the subcommittee report.

LXXXI. Time to Degree / Credit Hours to Graduation

LXXXII. Announcements
   a. Brooke Durbin for Jeff Caw菲尔d – Provost Roberts announced formation of the Retention and Graduation Rate Performance taskforce. Membership will be primarily faculty.
   b. John Gallagher – Miner Challenge cookie dough sales are underway. Orders are due October 24. Delivery will be before Thanksgiving.
   c. Dave Westenberg – There is a volley ball game tonight, and the Pink Out game is Saturday at 3 pm.
   d. Patti Fleck – Beginning October 14, new walk-in hours for the Counseling Center will be Monday-Friday from 10:00 am until noon and from 2:00 pm until 4:00 pm.
   e. Dan Reardon – Fine Linen Theater is presenting Charley’s Aunt. Performances will be held tonight through Saturday.

LXXXIII. Next Meeting – October 24, 2019
8:15 am – 9:15 am, Silver and Gold Room, Havener Center