

Strategic Planning Summer Working Group Report for First and Second Year Experience August, 2015

Section 1: Charge

Review and consider recommendations to significantly enhance the first and second year experience at Mines from a holistic perspective.

Section 2: Relationship to Strategic Plan

Enhancing the distinction and reputation of the first and second year experience for students at the Colorado School of Mines.

Section 3: Membership

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Section 4: Summary of deliberations

Our initial report is presented in order of the “suggested first efforts” given by Academic Affairs. Our committee was organized into subcommittees investigating each of the suggested first efforts. These subcommittees reported out on:

- 1. Define and articulate the purpose and intended outcomes of our first and second year curricula and experience*
- 2. Consider strategies for developing faculty and student buy-in related to the value of the core.*
- 3. Identify best practices at other institutions, assess the status of our existing first and second year*
- 4. Initial areas of “opportunity” for improvement*

The subcommittee reports are given next, along with recommendations for strategies for enhancing the first and second year experiences.

1. Define and articulate the purpose and intended outcomes of our first and second year curricula and experience

“What do we know about the effectiveness of the first year curriculum?”, “Why do students come here for the first two years?” and “How can we add value to the first two years in order to justify the ~\$40K expenditure required to attend for two years?” We identified three major themes in answer to these questions: improving the experience of transfer students, enhancing synergy between core courses, and enhancing the personal connections between faculty and students.

Success rates for transfer students are lower than desirable and credits completed is higher than is typical of freshmen students. Transfer students’ experiences are typically very different from that of students who enter as freshmen. Introduction to resources, development of connections with faculty, introduction to co-curricular opportunities could be enhanced. The new CSM 101 course may address some of these issues.

Turning to the students who do come for the first two years, the core curriculum committee is in early stages of discussing and documenting competencies that are emphasized throughout the core. This documentation has the potential to identify opportunities for cross collaboration. There are opportunities for consistent approaches to topics such as ethics, to strategies such as teamwork, and to course requirements such as which style guide format to require.

Barriers to increased coherence include limited time and opportunities for faculty to discuss curriculum across departmental boundaries. We are proposing a campus-wide core curriculum faculty meeting as an opportunity for faculty to provide brief overviews of their courses and to engage in discussion of opportunities for collaboration. The core curriculum committee initiated these conversations in Spring 2015 and is the logical group for convening a campus-wide discussion. We have begun to document competencies emphasized among the core courses. This is in addition to existing mappings of ABET outcomes to the core courses. Physics and calculus faculty collaborate to address skills/content in order to reinforce these skills for students and to align the content in the courses to support learning. A campus-wide gathering of core curriculum faculty could expand these types of collaborations. Content in some courses is fairly static, while in others (possibly EPICS) there is more variation from year to year. Sharing information about each semester’s EPICS project (for example) might enable faculty to integrate elements of an EPICS project into their courses.

In our final goal, personal connections between students and faculty, there is fruitful conversations to be had regarding enhancing mentoring or other informal but important relationships between students and faculty. Some students may benefit from faculty being more intentional about inviting or requiring students to office hours. Consider Kevin Moore’s example of an institution where faculty engage with a small group of students, not as advisors, but in some role that fosters connections. Or require (maybe via CSM101?) every first year student to meet with a faculty member (maybe in office hours or maybe this is a faculty member that does not teach one of the student’s classes.) We should also consider periodic social or other informal events where all faculty in a particular department introduce themselves to all majors (and/or possibly to interested majors), strategies for department head and/or institutional recognition for faculty who go above and beyond to connect with students, particularly outside of the classroom, or explore options for additional faculty-student collaborations within the context

of residence life. There are several models from other institutions that do this well. Our subgroup acknowledges that we do not know to what extent this is already occurring outside of the living learning communities. The themed learning communities in freshmen housing have been successful in achieving this here at CSM for the last 3 years. The communities include: Nucleus Scholars, Adventure Leadership, Athleticism & Wellness, Oredigger Leadership, Engineering Grand Challenges, and Visual & Performing Arts. There is a faculty friend who works with these communities from move in day to the end of their first year, often beyond.

Lastly, the committee wonders if the rescheduling of Celebration of Mines to a time when faculty are less likely to attend has other benefits to students that outweigh the lower faculty interest in attending the event.

Recommendations:

- We are proposing a campus-wide core curriculum faculty meeting as an opportunity for faculty to provide brief overviews of their courses and to engage in discussion of opportunities for collaboration.
- Enhance mentoring or other informal but important relationships between students and faculty.

2. Consider strategies for developing faculty and student buy-in related to the value of the core.

Having established that a major factor contributing to the success of college students is a positive relationship with a faculty member, it is proposed that all students be assigned a faculty mentor in their first year, from a field of interest to the student. Each faculty member could be assigned a small “tutorial group” of students, with whom they would initially meet weekly for informal seminars/discussions, and later provide support throughout the students’ degree program. To reduce the time commitment of the faculty member, the same group of students would also have a CASA advisor to discuss their immediate goals and course work, but now also have a faculty member to discuss their science/engineering ideas, questions, and “big picture” career goals. The faculty member would organize discussions for freshman students on topics pertaining to their research field or other special topics, and encourage students to take up their own special projects/topics. (As a great example, in past semesters, small sections of well motivated CSM 101 students successfully organized seminars by Nobel Laureates!) This small group would also serve as a good network between the students. We propose piloting such a program with 5-10 faculty members, and later expanding it if both faculty and students find it motivating and rewarding.

A stronger focus should be also given to continuity (content retention) for students from the first semester onward through better scaffolding. Including ethics and writing/communication in that scaffolding is important. One aspect is improving coordination among first and second year courses, taking a more integrated approach rather than each department making decisions in isolation. Another facet is to shift the grading system to incentivize learning and idea synthesis over test-taking. We feel this could be achieved by decreasing how much the first and second year grades count towards the students’ overall GPA, and possibly offering a P/F option on certain courses. A more dramatic approach taken by some major universities to shift the motivation toward long-term learning is to make the first semester or year P/F. This option also encourages students to take more challenging or unusual courses, rather than sticking with required courses and those most likely to bolster their GPA.

To further enhance the first and second year academic experience, guest lectures and discussions should be coordinated in core courses (Chem, Physics, Calc, NHV, and possibly CSM 101). Guest lecturers can be Faculty teaching upper-level courses, industry professionals, alumni, and talented graduate students. For example, Career Fair is an excellent opportunity to bring fresh, inspiring perspectives into the classroom. A list of outside collaborators and "guest lecturers" (along with their area of specialty/discussion topic) could be compiled across campus to provide a resource for any instructor looking for a guest lecturer on a particular topic.

Finally, implementing these recommendations will require strong support from the Administration and all levels of the Faculty. We need to develop an overall expectation that research-active faculty will interact closely with first and second year students as a factor in the promotion and tenure process. The importance of such programs should also be acknowledged in the form of compensation (course releases, program funding, summer salary, etc.). To become a model university on par with the best programs worldwide, we need a cultural shift, bringing a level of prestige to those who contribute to a positive experience for all Mines undergraduate students.

Recommendations:

- All students be assigned a faculty mentor in their first year, from a field of interest to the student. Each faculty member could be assigned a small "tutorial group" of students, with whom they would initially meet weekly for informal seminars/discussions, and later provide support throughout the students' degree program.
- Guest lectures and discussions should be coordinated in core courses
- Improving coordination among first and second year courses, taking a more integrated approach rather than each department making decisions in isolation

3. Identify best practices at other institutions, assess the status of our existing first and second year

Our subcommittee first looked at General Approaches: High Impact Practices (HIP). According to the Association of American Colleges and Universities (following the work of George Kuh in *High-Impact Educational Practices*), a number of educational experiences are conducive to high-impact learning, including:

- First-year seminars and experiences
- Common intellectual experiences (such as the core curriculum)
- Learning communities
- Writing-intensive courses
- Collaborative assignments and projects
- Undergraduate research
- Diversity and global learning in courses or programs that examine "difficult differences"
- Service- or community-based learning
- Internships
- Capstone courses and projects

It was noted that many of these suggested experiences are currently captured by the CSM 101 and NHV curricula. In order to investigate new or novel approaches to first and second year experiences, we looked at programs at:

- Georgia Tech
- University of Kansas
- University of Wisconsin (Madison)
- Loyola University
- Massachusetts Institute of Technology
- University of Texas (Austin)
- Michigan Tech
- University of Notre Dame

Highlights associated with each of these programs are available from the committee chair. Common themes amongst the studied programs are:

- Establishing a strong connected community with the associated residential campus
- Senior faculty involvement at the freshman level through seminars, etc.
- Active outreach programs to get freshmen and sophomore level students involved in faculty research activities
- Themed learning communities/focused interest groups (FIGs)

Recommendations:

- One credit seminar courses taught by senior faculty, limited to 10 students, topic chosen by the faculty member (credit could be used for free elective with repeated seminars permitted).
- Similar to program at Notre Dame, host a freshman research forum exposing the freshman to research activities where paid or unpaid positions are available. Also maintain a website with paid and unpaid opportunities for freshman to participate in research activities.
- Increasing the number of themed learning communities.

4. Initial areas of “opportunity” for improvement

There are numerous aspects of the first and second year experiences at CSM that make Mines a unique place. The committee has chosen to focus on the aspects that warrant further attention to further define and enhance the distinct nature of our program.

1. Reduce/eliminate sources of frustration for students in our curriculum.

Several members of the committee noted that many students and faculty express frustration with the curriculum. While some frustration is expected as part of the cognitive struggle necessary to learn complex knowledge and skills, there are factors of the curriculum that could be addressed to focus the struggles on learning. For instance, students come to CSM with strong content knowledge and skills, but each student brings strengths in different areas. Consequently, first year courses are designed in an attempt to meet the needs of students with little or no prior experience in the content area as well as those with high levels of competencies. For example, more and more students are

bringing in AP credit. To accomplish this, the courses tend to target the middle of the bell curve. This often leaves students on either end of the bell curve feeling frustrated, as their specific needs are not met.

Another area of frustration is the course and workload. The work should be focused on cognitive rigor, not on volume of tasks. The heavy load and required credits limit students from flexibility to pursue their own interests and to explore different majors early in their career. Homework and class assignments should be reviewed to shift toward productive rigor and not just intensity.

Recommendation: The committee will examine this area in greater detail over the coming months. We encourage other faculty to provide feedback and suggestions. Perhaps we should consider a design that reduces the variance of ability in sections of courses (grouping by ability and prior experience). Another area to consider exploring would be designing the first and second year curricula utilizing a competency-based approach.

2. Improve the active learning and hands-on nature

One area that defines the CSM experience is both the hands-on direct experience with design and industrial equipment alongside rigorous learning experiences that facilitate active learning. This builds students' critical thinking and life-long learning abilities. In other words, students are able to tackle complex problems, adapt to new situations, and continue to learn and advance in their field based on their CSM experiences. Some prime examples are the studio courses in physics and biology, field experiences, REU program, and internships. Numerous studies show significant gains in student learning in active learning environments.

Recommendation: These aspects, as well as other ways to expand active learning and hands-on learning so they are more deeply embedded should be explored to consider ways to integrate across the first and second year experiences.

3. Improve and deepen relationships in first year

Another distinct aspect that is often noted about CSM is the relationships that form between faculty and students, students with other students, and students with the community (local and industry).

Recommendation: The committee wants to further explore the existing structures that facilitate or inhibit the productive development of these relationships.

4. Improve integration of the educational experience

Although there was a time when CSM faculty coordinated efforts across content areas for the first and second year core courses, it has been some time since this has happened. The committee noted distinct advantages to defining and coordinating

curricular efforts both laterally (across a student's program of study – 4 years) and horizontally (i.e., within a freshman sequence such as the NHV/EPICS Grand Challenge Pilot).

Recommendation: We should more clearly identify the fundamental skills and knowledge that all graduates must have to be successful and to carry forth the vision of a CSM graduate. For instance: problem solving, design, writing and communication, research skills, leadership abilities, and so forth. Opportunities and structures should be created to explore and develop connections between different courses in the CORE curriculum.

5. Make potential pathways and majors easily visible

It should be obvious to all students what pathways are available to them and what doors each major and minor can open. This includes graduate school opportunities. Often students come with limited understanding of what options are available and what is required or supported in each pathway. We should explore options to make these more visible to students.

Recommendation: One suggestion was developing research colloquium opportunities for students lead by senior researchers at CSM. Another is to provide regular events that highlight the majors for all students. The first year seminar idea could be a place where these pathways are explored too. Students may be exposed to an area that they know little about through one of the seminars.

Section 5: Recommendations

Specific recommendations as they relate to each of the initial avenues of investigation are given in each of the sections above.

Section 6: Next steps

Invite faculty across campus to comment on the individual recommendations developed by each of our subcommittees. Also interact with other administration units (CASA, registrar's office, etc.) on possible impacts our recommendations may have. After a suitable period of time for input from all interested parties, our committee envisions moving forward with specific deliverables on each of our recommendations.

Section 7: Resources/references consulted

- FACTIR white paper
- Senior survey results related to core curriculum
- Matrix of competencies emphasized in common core and distributed science courses
- Survey results related to faculty knowledge of the core curriculum
- Assessment methods in use to assess core courses
- Grades in core courses and students' retention status

- DFW grades in the core curriculum
- Alignment of core courses to ABET outcomes

- General Approaches: High Impact Practices (HIP), Association of American Colleges and Universities

- Presentation on Common Reading Programs:
http://www.sc.edu/fye/research/research_presentations/files/2015/young_keup/ACPA%202015%20-%20Telling%20the%20Story%20of%20Common%20Reading%20Programs%20-%202015.02.27_JRK%20Edits.pdf
- Presentation on First & Second Year Transition Programs:
http://www.sc.edu/fye/research/research_presentations/files/2015/young_keup/ACPA%202015%20-%20First%20and%20Second-Year%20Objectives%20-%202015.03.03.pdf
- Presentation on First & Second Year Transitions:
http://www.sc.edu/fye/research/research_presentations/files/2014/skipper/Y2Transitions_Skipper_v3.pdf