Welcome

Jeff King

Approval of Minutes – January 27, 2021

Jeff King

MOTION: To approve the Undergraduate Council Minutes of January 27, 2021 by Barankin, seconded by Nicholas. No abstentions. APPROVED.

Briefings and Informational Items
Office of Undergraduate Studies

Vibhuti Dave

No updates from the Office of Undergraduate Studies.

Registrar’s Office

Paul Myskiw

Myskiw informs Senators of the policy-change recommendation regarding undergraduate students taking 500-level courses. This will be discussed in both Undergraduate and Graduate Councils. Myskiw states around 200 undergraduate students take 500-level courses, with an estimated 1366 undergraduates having taken 500-level courses since 2018.

The policy will not be changed; additional language will be added for seniors to take up to six 500-level courses.

This item will be considered for Council vote.

Curriculum Items for Council Vote

Major Curriculum Changes – Request for Council Vote (from 1/13/21)

1.1 COMPUTER SCIENCE

[status: CIM 1/6]

1 program change: BS in Computer Science

1. CS and Business Track: added EBGN230 to list of business electives.

2. CS and Robotics & Intelligent Systems Track: updated focus area courses to provide flexibility in student’s degree path. Focus areas divided into (1) Perception, (2) Cognition, (3)
Interaction. Areas contain two courses. Students can take both courses in one area and one course from the other two areas.

3. CS and Space Track: Proposal driven by high demand of computer scientists in the aerospace industry. The curriculum was chosen after consulting with CS@Mines faculty, Director of Center for Space Resources at Mines, and several Lockheed Martin software engineers. Unique in its focus on interdisciplinary knowledge related to aerospace engineering and space resources.

**MOTION:** To approve the program change to the Bachelors of Science in Computer Science by Paone, seconded by McClelland. No abstentions. **APPROVED.**

1.2 **PETROLEUM ENGINEERING**

Linda Battalora

[status: CIM 12/2]

1 program change: BS-PTE: BS in Petroleum Engineering

The Petroleum Engineering department in cooperation with the Trefny Center initiated a review of the petroleum engineering curriculum in Fall 2019. The goals include reduction of course rigidity; determination of material additions, deletions, and potential sequencing options; incorporation of technological capabilities such as online courses or other pedagogical approaches; explicit linking of courses to each other and documentation for staff, faculty and especially students.

Learning outcomes have been identified (total of seven). A determination of “phase changes” are being established.

[status: CIM 12/02]

2 course changes: PEGN311: Drilling Engineering

Currently, PEGN311 was 4 credit hours, 3 lecture, and 1 lab. Recent PEGN curriculum changes have been shifted with the proposed new course PEGN201: Petroleum Engineering Fundamentals. To fit within the credit hour limits of the overall curriculum as well as within the semester the drilling course is required, 1 credit hour of lecture can be dropped without compromising the education of the petroleum engineer. Additionally, this course is then more in-line with the credit hour limits of the other petroleum engineering base classes (ex: completion, stimulation, production, and reservoir engineering).

Updates have been made to contact hours and total weekly meeting hours.

PEGN201: Petroleum Engineering Fundamentals

Changes made to course name and addition of student learning outcomes. Current PEGN102 course is designed for any major and is exceptionally general. This course will now be required in the Petroleum Engineering curriculum and will be offered as a 200-level course. Course number will be changed to 201 at later date. More detailed base-engineering material and starting student understanding of the impact of subsurface resource acquisition impacts on health, environment, security, economics, and sustainability.

[status: CIM 12/2; Provost approved: 12/3]

3 new courses: PEGN282: Professional Skills 1

PEGN382: Professional Skills 2

PEGN482: Professional Skills 3

This course provides an opportunity to study professional skills and advance the following Mines@150 skills:

- Producer of differentiated and highly desired STEM educated leaders through the study of leadership skills
- Exemplar for alumni affinity, visibility, and involvement through alumni engagement in the course
- Educate and empower students for all backgrounds making Mines more attractive to qualified students from all backgrounds (including groups that are currently underrepresented in the Mines’ student body)

**MOTION:** To approve 1 program change to the Bachelors of Science in Petroleum Engineering, 2 course changes to PEGN311 and PEGN201, and three new courses PEGN282, 382, and 482 by McClelland, seconded by Battalora. No abstentions. **APPROVED.**

1.3 **MECHANICAL ENGINEERING**

Oyvind Nilsen

1 program change:
MIN-BMECHE: Minor in Biomechanical Engineering

*Proposed change is making CBEN120 optional/elective course with no other changes proposed.*

Nilsen informs Councilors of discussions between Chemical and Biological Engineering and Mechanical Engineering regarding the removal of the prerequisite CBEN120. Mechanical Engineering favors biomechanical engineering as a more mechanical study regarding implants and prosthetics. The idea is to provide students with the option to choose between mechanical and additional biology courses.

A comment is provided regarding the importance of understanding how these prosthetics interact intimately with a biological system, and it is seen as essential to build off of. CBE is open to collaboration in making the biology course more useful in meeting the mechanical engineering needs.

An additional comment is made regarding the label of biomechanical engineering without some understanding of how the human body works.

**MOTION:** To approve the program change to the Minor in Biomechanical Engineering by Jin, seconded by Paone. 5 opposed; 2 abstentions. **APPROVED.**

1.4 **ELECTRICAL ENGINEERING and COMPUTER SCIENCE**

Jeffrey Paone

1 program change:
MIN-RIS: Minor in Robotics and Intelligent Systems

*Course updates to provide flexibility and align with robotic knowledge areas.*

**MOTION:** To approve the program change to the Minor in Robotics and Intelligent Systems by Barankin, seconded by Paone. No abstentions. **APPROVED.**

1.5 **CIVIL and ENVIRONMENTAL ENGINEERING**

Hongyan Liu

1 new course:
CEEN315: Civil and Environmental Engineering Tools

*This new course introduces students to the tools and vernacular needed to excel in industry. Depending on the module, the course can be delivered in various modes (in-person, hybrid, remote, or online).*

**MOTION:** To approve the program change to the Minor in Robotics and Intelligent Systems by Barankin, seconded by Leiderman. No abstentions. **APPROVED.**

Minor Curriculum Changes
The following minor course changes will not be discussed unless specifically requested by Council.

1.6 **CIVIL and ENVIRONMENTAL ENGINEERING**

[status: CIM 1/6]

1 course change: CEEN311: Mechanics of Materials

*Change has been made to the catalog description.*

1.7 **CHEMISTRY**

[status: CIM 12/15]

2 course changes: CHGN336: Analytical Chemistry

*Faculty who have taught Analytical Chemistry (CHGN 336) have noticed that students who have not taken Organic Chemistry (CHGN 221) struggle with the course material. The concepts of Thermodynamics (CHGN 209/CBEN 210) are not as heavily used, so the analytical faculty have proposed replacing the thermodynamics pre-requisite with a C- or better grade in Organic Chemistry. The chemistry faculty voted on this change and approved it unanimously with one abstention.*

CHGN337: Analytical Chemistry Laboratory

*The faculty who teach analytical chemistry have observed that students who have not taken Organic Chemistry (CHGN 221) and its associated lab course (Organic Chemistry Lab I, CHGN 223) struggle with the analytical chemistry laboratory. This change was voted on by the chemistry faculty and approved unanimously with one abstention.*

1.8 **COMPUTER SCIENCE**

[status: CIM 1/6]

1 course change: CSCI400: Principles of Programming Languages

*The catalog description has been updated; CSCI358 has been added as prerequisite for students to strengthen knowledge prior to entering the course and enforce sequence amongst courses.*

2 new courses: CSCI295: Industry Exploration I

CSCI395: Industry Exploration II*

*Serves as a bridge between Mines and industry partners, faculty and industry partners, and students and industry partners.

*CSCI 395: Typo in contact hours. “Lecture: 0 / Lab: 1”

1.9 **GEOPHYSICS**

[status: CIM 12/16]

1 course change: GPGN455: Earthquake Seismology

*GPGN461 remove from prerequisite list; both 455 and 461 are taught in the same semester and 461 is not necessary for success in 455.*

1.10 **APPLIED MATHEMATICS and STATISTICS**

[status: CIM 12/14; Provost approved: 12/14]

1 new course: MATH470: Mathematical Modeling of Spatial Processes in Biology

*AMS has run this course twice as a special topics course (MATH 498/598) and would like to offer it more regularly.*

**MOTION:** To approve by omnibus vote items 1.6-1.10 by Barankin, seconded by Paone. No abstentions.

**APPROVED.**

**New Curriculum Items**
2.1 PETROLEUM ENGINEERING
[status: CIM 2/2]

1 program change: MINASI-PE: Petroleum Engineering
Update to course list to reflect approved new courses and course changes. [Replacement of deactivated course PEGN102 with PEGN201].

Minor Curriculum Changes
The following minor course changes will not be discussed unless specifically requested by Council.

2.2 PHYSICAL EDUCATION and ATHLETICS
[status: CIM 1/25; Provost: 1/25]

3 new courses:
- PAGN245: Slackline
- PAGN286: SRC – Group Fitness
- PAGN287: SRC – Workouts

PAGN298A A change PAGN245

A student approached the department with his desire for this class, he did the research determining the students’ interest in class, located the alum instructor and it has been very successfully taught for two semesters. This class meets for 8 weeks, first 8 weeks of fall and last weeks of spring to accommodate the weather. It fits great into the Mines@150 goals for wellness and student mental health.

- PAGN286: SRC – Group Fitness
- PAGN287: SRC – Workouts

PAGN298A B & C change to PAGN 286 and 287

Requesting the creation of these two courses, SRC Group Fitness and SRC Workout, to support the Mines@150 goals for wellness and student mental health. Both classes utilize the great work of the student recreation center and need for flexibility for the students to have classes that work into the busy schedules. Both classes are arranged to allow for students to complete them on their own and work into any student schedule. The have been great asset these last two difficult semesters.

Curriculum Items in Progress – for vote 2/24/21

Major Curriculum Items

3.1 INTERDISCIPLINARY
[status: CIM 1/15; Provost: 1/15]

1 new program: Minor in Quantum Engineering (requires CIM code assignment)

This internationally distinguished program will differentiate our undergraduates by giving them substantive background in chemistry, computer science, electrical engineering, mathematics, materials science, and physics for quantum computing, communication, and sensing. Students with disparate backgrounds will gain experience with quantum hardware and theory that will prepare them for careers in rapidly evolving quantum engineering industries. This minor will build directly upon the opportunities, infrastructure and industry partnerships that have made the Quantum Engineering MS program so successful in its first year.

Brennecka states that the standard linear algebra course will be accepted alongside the honor’s linear algebra course.
3.2 ENGINEERING, DESIGN, AND SOCIETY
Carrie McClelland

1 program change: BS-EGN: BS in Engineering
Changing credit hours for EDNS191 to reflect credit hour changes made to streamline equivalencies with EDNS151 and HASS100. Changed program outcomes from ABET a-k to ABET 1-7. Edited the introductory overview to reflect current messaging, grammatical error correction, and provide additional specification (no substantial changes). Changed credit hours required for EDNS191 and EDNS192 to reflect course change requests made to better align with EDNS151/NHV100 which can substitute ENDS191/192 for students who enter the program in their freshman year. Added STEM teaching focus area which is unique to Mines.

[status: CIM 1/18]

7 course changes: EDNS191: Integrative Design Studio IA
EDNS192: Integrative Design Studio IB
EDNS291: Integrative Design Studio IIA
EDNS292: Integrative Design Studio IIB
EDNS391: Integrative Design Studio IIIA
EDNS392: Integrative Design Studio IIIB

Course description changes to better reflect course content, no substantive changes to curricula.

3.3 GEOLOGY and GEOLOGICAL ENGINEERING
Cheryl Medford

1 program change: BS-GLE: BS in Geological Engineering
Program changes reflect updates to the BS curriculum in GE agreed upon by the faculty in the department. The faculty evaluated our program objectives, the sequencing of classes, and the connections among learning outcomes in the 200 and 300-level courses. The outcomes of that analysis include eliminating GEGN206, incorporating select learning outcomes from GEGN206 into GEGN212, adding a new course GEGN217 and reducing credits for GEGN317. New curriculum is the same number of total credits as the current curriculum.

3.4 ECONOMICS and BUSINESS
Becky Lafrancois

1 program change: MIN-BUEN: Minor in Business and Entrepreneurship
This edit to the minor adds 3 classes to the list of classes students may choose from to incorporate recent new course additions in Business.

3.5 COMPUTER SCIENCE
Jeffrey Paone

1 course change: CSCI261: Programming Concepts
Adding CSCI 101 as a prerequisite.

A comment is brought to the Council on the importance of providing an introductory computer programming course at Mines and that the split of the introduction into multiple credits discourages this introduction.

A question is brought up on the existence of a challenge exam for 200-level courses, as there is one for 100-level courses.
Paone responds that CSCI101 has been deemed as a sufficient introduction and thus an acceptable prerequisite for future courses down the line. Other CS courses such as Intro to Data Science and Machine
Learning have CSCI101 listed as a prerequisite.

Dave provides an update from the Core Curriculum Committee on discussions regarding the need for a computing course on campus. This has been a topic of ongoing discussion between the committee and Mines’ department heads. Dave states that the committee has heard from department heads that there is a need for a computing course that can span across multiple departments.

3.6 **APPLIED MATHEMATICS and STATISTICS**

Mike Nicholas

[status: CIM 1/18; Provost: 1/19]

1 new course: MATH431: Mathematical Biology

*This course will serve as an intermediate modeling course and the capstone (484) will remain as the advanced modeling course. Course number change 331 → 431.*

1 deactivation: MATH331: Mathematical Biology

**Minor Curriculum Changes**

The following minor course changes will not be discussed unless specifically requested by Council.

3.7 **MECHANICAL ENGINEERING**

Carolyn Freedman

[status: CIM 1/17; Provost: 1/17]

1 new course: AMFG423: Design and Analysis of Experiments

*This online course provides innovative state-of-the-art experiment methods to best characterize and optimize systems/processes in most any domain, though particularly so for Mines@150 S&T frontiers (Materials and Advanced Manufacturing, Earth and Space Exploration/Technology/Engineering, Energy and Water)*

*This course is cross listed with AMFG523 and has previously been offered as an AMFG Special Topics Course.*

3.8 **CHEMICAL and BIOLOGICAL ENGINEERING**

Michael Barankin

[status: CIM 1/20]

3 course changes: CBEN401: Process of Optimization

*Changes to prerequisites; addition of CBEN375 and CBEN402. Removal of CBEN375. This course is a practical follow-up to chemical engineering design and relies on many of the objectives attained in CBEN402.*

CBEN408: Natural Gas Processing

CBEN409: Petroleum Processes

*Removal of redundant prerequisites.*

3.9 **CIVIL and ENVIRONMENTAL ENGINEERING**

Hongyan Liu

[status: CIM 1/19]

1 new course: CEEN442: Timber and Masonry Design

*Course number change. 440 → 442.*

12 course changes: CEEN267: Design II: Civil Engineering

*Change to title “Epics II: Civil Engineering” to “Design II”; updates to course description.*

CEEN303: Environmental Engineering Laboratory

CEEN401: Life Cycle Assessment

CEEN402: Project Engineering

CEEN406: Finite Element Methods for Engineers

CEEN410: Advanced Soil Mechanics

CEEN446: Structural Loads
3.10 COMPUTER SCIENCE

Jeffrey Paone

[status: CIM 1/19; Provost: 1/19]

1 new course: CSCI425: Compiler Design

This course will promote Mines as a producer of high-quality professionals in the field of computer science and a leader in secondary STEM education. This course will be taught using Formal Learning Groups which promotes collaboration, openness, and responsibility. Residential (>50% online) or online. This course can be delivered either 100% online or 100% residential.

3.11 ECONOMICS and BUSINESS

Becky Lafrancois

[status: CIM 1/19; Provost: 1/20]

1 new course: EBGN444: Innovate X

Innov8x fills an entrepreneurship and innovation gap in EB curricula in problem definition: the investigation and framing of a wicked problem in the context of ambiguity, uncertainty, and complexity and hands-on, and the iterative process of solving problems creatively. The course provides professionally oriented pre- and post-graduate education options and is already attracting new students to Mines. It has been piloted using face-to-face, remote, and hybrid modalities expanding the delivery capabilities.

3.12 ENGINEERING, DESIGN, AND SOCIETY

Carrie McClelland

[status: CIM 1/18]

1 course change: EDNS479: Community-Based Research

Pre- and corequisite changes needed to allow graduate students in Humanitarian Engineering and Sciences program to take the course without submitting paperwork with the Registrar.

3.13 GEOLOGY and GEOLOGICAL ENGINEERING

Cheryl Medford

[status: CIM 1/15-20]

2 course changes: GEGN212: Petrology for Geological Engineers

Changes to GEGN212 reflect updates to the BS curriculum in GE agreed upon by the faculty in the department. Outcomes of the analysis include eliminating GEGN 206, incorporating select learning outcomes from GEGN 206 into GEGN 212, adding a new course → GEGN217 and reducing GEGN 317 credits.

GEGN317: Geologic Field Skills

Geologic Field Methods is moving to Spring of the Sophomore Year (GEGN217). Current GEGN317 needs to be revised and changed to a one-credit class that focuses on developing our GE majors mapping skillset and fully preparing them for GEGN316 (Field Camp).

1 new course: GEGN217: Geologic Field Methods
GE faculty have recognized that the GE majors are currently missing a field-based course to act as a crucial steppingstone between the GEGN203, 204, and 205 sequence (Fall of sophomore year) and GEOL309 and subsequent courses taken in the junior year. This new course, taught in the Spring semester of sophomore year fills that critical gap by fully preparing GE majors for subsequent geology courses in their junior year. In starting the development of student field-skills earlier, students will also be able to build those skills in preparation for Field Camp.

1 deactivation: GEGN206: Earth Materials

3.14 **HONORS**

[status: CIM 1/14]

1 course change: HNRS115: Innovation and Discovery in Engineering, Arts, and Sciences II

*Changing prerequisites to move on to HNRS115 to a C- or better in HNRS105.*

3.15 **UNIVERSTITY HONORS**

[status: CIM 1/19; Provost: 1/20]

5 new courses: MAED405: Mathematical Practices and the Social Context of Mathematics

*This course provides teacher candidates an opportunity to develop the skills to promote students’ mathematical identity and their understanding of mathematical practices and processes – mathematics is a community of inquiry – as articulated in the Colorado Academic Standards and Common Core.*

MAED425: Pre-Algebra and Algebra Teaching Techniques

*In this course teacher candidates will be exposed to evidence-based instructional practices to support students’ learning of pre-algebra and algebra and modeling meaningful learning opportunities, common misconceptions and ways of thinking, and students’ learning progressions.*

MAED435: Computer Science Teaching Techniques

*This course provides teacher candidates an opportunity to develop the skills to promote students’ computer science (CS) identity and their understanding of CS practices and processes – including computational thinking – as articulated in (1) the Computer Science Teachers Association and (2) the Colorado Academic Standards.*

MAED464: Capstone Curriculum Design I

MAED465: Capstone Curriculum Design II

*This course provides Mines students an intensive teaching experience in a K-12 mathematics or computer science classroom. The goal of this course is for the student to develop and demonstrate competencies in the areas of planning, instructional methods, assessments, creating effective learning environments for all learners, classroom management and organization, content knowledge, and professionalism.*

[status: CIM 1/19; Provost: 1/20]

6 new courses: SCED333: Education Psychology and Assessment

*The purpose of this course is to present this new science of learning so that educators can creatively translate the science into exceptional practice. This course covers field-defining learning theories ranging from behaviorism to cognitive psychology to social psychology and some lesser-known theories exceptionally relevant to the practice, such as arousal theory.*

SCED363: Dynamic Teaching: Motivation, Classroom Management, and Differentiation of Instruction

*The purpose of this course is to prepare future educators to be able to motivate students, manage classroom behavior, and differentiate their instruction so that all students can learn.*

SCED415: Scientific Practices vs Engineering Design and the Nature of Science
The goal of this course is to prepare students to integrate knowledge of scientific and engineering practices into their teaching as articulated in the Colorado Academic Standards and the Next Generation Science Standards, including asking questions, defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, obtaining, evaluating and communication information.

SCED445: Physics and Chemistry Teaching Techniques

In this course students will engage as learners of physics and chemistry through evidence-based teaching strategies. After each unit of instructions, students will reflect on the practices used during the unit and why these practices were effective techniques for teaching science.

SCED464: Capstone Curriculum Design I
SCED465: Capstone Curriculum Design II

This course provides Mines students an immersive teaching experience in a K-12 science, engineering, or STEM classroom. The goal of this course is for the student to develop and demonstrate competencies in the areas of planning, instructional methods, assessments, creating effective learning environments for all learnings, classroom management and organization, content knowledge, and professionalism.

3.16 MECHANICAL ENGINEERING
[status: CIM 1/18]
3 course changes:
MEGN300: Instrumentation & Automation
MEGN301: Mechanical Integration & Design
Add C- to requirements for prerequisites to be consistent with other ME courses.
MEGN412: Advanced Mechanics of Materials
Changes to course description and updates to student learning outcomes. The topic of Elasticity was moved to MEGN510 and changes this course’s details.

3.17 METALLURGICAL and MATERIALS ENGINEERING
[status: CIM 1/12]
1 course change:
MTGN219: Art and Science of Glassblowing
Changes to course description regarding limited capacity of course.

3.18 PHYSICS
[status: 1/19]
1 new course:
PHGN417: Fundamentals of Quantum Information
This course will be part of the new Quantum Engineering minor, and more broadly increase quantum literacy across campus. This is an undergraduate-level version of PHGN519, Fundamentals of Quantum Information. The courses have the same title, catalog description, and textbook. The class meetings themselves will be the same. The undergraduate version will be shorter with less difficult homework assignments.

Other Business
Request to Suspend PE Midstream Engineering Minor
Linda Battalora

Battalora makes a request on behalf of the Petroleum Engineering department to suspend the Midstream Engineering minor for two years. The program was approved for Fall 2017 to educate petroleum engineers to work in both upstream and midstream sectors of the oil and gas industry. The pandemic and low demand on oil and gas has pushed a decline of student enrollment in the minor, Battalora reports. There has been difficulty filling the midstream courses, but these courses cannot be cancelled due to the enrollment of 3-4 students. The suspension would allow the department time to realign goals and address
marketing strategies.

The suspension would honor the students still enrolled within the minor, but no incoming students will be able to select this minor in Midstream Engineering. Currently there are 4-5 students enrolled in the minor.

**Academic Policy Subcommittees**

Jeff King

King introduces formation of three ad hoc subcommittees of Undergraduate Council: Student Workload Guidance, Consistency in Grading, and Course Approval Processing subcommittees. The Student Workload Guidance subcommittee will provide guidance related to Review Week, Final Exams, and course holidays with recommendations on student workload. Consistency in Grading will discuss plus and minus grading and related materials. The Course Approval Processing subcommittee will begin brainstorming a mechanism for a practical course approval process.

Myskiw suggests the Course Approval Processing subcommittee correlate their efforts with Graduate Council, as the approval process of courses is similar. Dave suggests the same efforts be made with the Student Workload Guidance subcommittee and Graduate Council.

**MOTION:** To approve the formation of the ad hoc subcommittee for Student Workload Guidance by Barankin, seconded by Nilsen. No abstentions. **APPROVED.**

**Student Workload Guidance Subcommittee**

*Chair:* Mike Nicholas  
*Volunteers:* Becky Lafrancois, Oyvind Nilsen

**MOTION:** To approve the formation of the ad hoc subcommittee for Consistency in Grading by Barankin, seconded by Jin. No abstentions. **APPROVED.**

**Consistency in Grading Subcommittee**

*Chair:* Chuck Stone  
*Volunteers:* Michael Barankin, Derrick Hudson

Discussion begins on topics to be addressed by the subcommittee including plus and minus grading and academic freedom for faculty related to grading policy changes.

**MOTION:** To approve the formation of the ad hoc subcommittee for Course Approval Processing by Barankin, seconded by Jin. 8 abstentions. **APPROVED.**

**Course Approval Processing Subcommittee**

*Chair:* Jeff King

**Adjourn**

Meeting adjourned at 4:52pm.  
Next Meeting: February 24, 4:00 – 5:00 pm, via Zoom.