

Colorado School of Mines – GRADUATE COUNCIL MEETING AGENDA
February 14, 2024, 4:00 – 5:00 pm, via Zoom

Attendees:

Voting Members: 24 total (16 - majority needed for quorum). Quorum was present.

P	Soutir Bandyopadhyay (Chair)	P	Danielle Ostendorf (LB)	P	Andy Osborne (NSE)	P	Owen Hildreth (ME)
P	Adrienne Marshall (HSE)	P	Bettina Voelker (CH)		Jaeheon Lee (MN)		Jared Carbone (EB)
	Yaoguo Li (GP)	P	Juan Lucena (EDS)		Jim Ranville (GC)	P	Pejman Tahmasebi (PE)
P	Suveen Mathaudhu (MME)		Nikki Farnsworth (CBE)		Ryan Venturelli (GE)	P	Dong Chen (CS)
P	Adrienne C. Kroepsch (HASS)	P	Yamuna Phal (EE)	P	Rena Zhu (GSG)	P	Samy Wu Fung (AMS)
			Lori Tunstall (CEE)	P	Gabriel Walton (UCTE)	P	Uwe Greife (PH)

Other Regular Attendees and Guests

P	Tim Barbari (OGS)		Carolyn Freedman (OGS)	P	Jenny Briggs (OGS)		Vibhuti Dave (UG)
	Wendy Adams (HNRS)		D. Scott Heath (RO)		Paul Myskiw (RO)		Roxane Aungst (OGS)
	Sam Spiegel (Mines Online)		Suzanne Beach (Payne)		Jen Gagne (Grad Admissions)	P	Valerie Holt (AES)
	Jon Johnson (Mines Online)		Atef Elsherbeni (EE)		Richard Krahenbuhl (GP)		Kristeen Serracino (AA)
P	Colin Schneider (RO)		Cadi Gillette (IGP)				

Special Guest(s): Erik Menke, Andrew Petruska, Timothy Strathmann, Peter Aaen

Welcome

Soutir Bandyopadhyay

Briefings and Information Items

Office of Graduate Studies

Tim Barbari

I want to remind everyone about the Dean’s Fellowships that are 10% of the first year that you are making. This is the second year we have been offering this. We had a good cohort of students last year. They are willing to help and be a guide for anyone who comes on Visit Days. So far, I have only received a few nominations. I sent out another reminder on Monday to department heads and IGP directors, but just another reminder for those who may have not seen it to please send nominations in. When we talked to this year’s cohort, they said it was impactful and it helped them decide to come to Mines. The extra \$3,500 makes a huge difference in their relocation expenses. I think it can be effective for some of the top candidates that we are trying to attract here.

Question: Is there any update on the CBL Fellowship?

Answer: Jenny Briggs is running The Clare Booth Luce Fellowship. The committee has met and is starting the selection process. They are getting to a point where they can share nominations and potential candidates for offers in the week ahead.

Question: If our department has already submitted a nomination, do you want more nominations?

Answer: I am trying to hear from those who have not yet submitted a nomination.

Registrar’s Office

Colin Schneider for
Paul Myskiw

No updates.

Graduate Student Government

Rena Zhu

For the GRADS symposium, we are closing abstracts in the next few days, and we will be recruiting judges in specific departments where there are more abstracts than judges. If you see those emails coming your way, please sign up if you are able or encourage others to sign up.

New Business

1.1

CCUS

Erik Menke

[CIM 1/12; Provost 1/12]

1 new course:

CCUS522: NON-GEOLOGIC CARBON
CAPTURE AND UTILIZATION

This is an existing course that is an elective for the CCUS certificate program. The reason for this request is that it has been taught as a special topics course (SYGN598C) and now needs its own course number and listing.

This is not a new course but has been taught before. This semester will be the third time that it has been offered. It has been offered as SYGN598 so we are requesting a formal course number.

Question: One of the questions that has emerged with a lot of CCUS courses is on the prerequisite side since people come into this certificate from a variety of backgrounds. It has never been clear if we have clarified what these prerequisites are for people who are entering these certificates and potentially a master's degree down the road.

Answer: There are prerequisites for a few courses in development. I do not remember if there are any prerequisites for this course, but it is something I can investigate. When I talked to the previous instructors, they have not said anything about the prerequisites being an issue.

1.2

Graduate Faculty Definition in Handbook

Tim Barbari

The precipitating situation here is that there are researchers on campus who do not have a faculty title. They have clear credentials that they could be on graduate committees. Most of these are in the Payne Institute which sits outside of the traditional academic department structure. Some have H-indexes over 80 and we are not allowing them to be on student committees where they could be very helpful and useful. They have a title like Research Associate which is a catch-all title for people who are not research faculty or post-Docs. Everyone in between is then dumped into this group. Faculty appointments must run through departments, so these people are left out. I used this opportunity to look at the definition of graduate faculty that we have here compared to other institutions. Ours is very narrow because we state that the graduate faculty are the people who can be the primary advisor. Other institutions have a broader definition to include everyone who can be on committees and/or teach graduate courses. All faculty teach graduate courses so this is more of a definition around people who can serve on the committees. Currently, we state that the advisor must be a member of the graduate faculty and that committee members must be Graduate Faculty, Teaching Faculty, Research Faculty, Professor of Practice, or Emeritus faculty. If we want to include research associate, we are just adding more titles. I wanted to try to be less dependent on titles and just give people membership in what we call a graduate faculty. The attribute of graduate faculty could be added to Banner so we are moving the thesis committee forms into OnBase which is more simplified. It also allows the opportunity for the system. When the student creates their committee, it will check to see if these people are members of the graduate faculty and then OGS staff do not have to look them up individually so there are administrative efficiencies that could be done with this. There are only a couple of things that are different than what we currently do now.

The graduate faculty would have two classifications – the full members that could be the advisor and associate members which would apply to everyone else. All the titles would be lumped together as associate members, but they would still be eligible to be advisors by being elevated to a full member through the same process we use now with departmental votes. The joint appointments, research associates, and admin faculty

could then be members of a committee if we allow them to be so because we have found that these people have doctorates or fields of expertise that are relevant to Mines programs. This is a way to not be overly concerned about the title people have but the credential they have to be able to serve on committees. The beginning of the revision starts with stating the minimum requirements (for example, graduate faculty should have a PhD in the appropriate field to be on PhD committees and then flows from the existing language that is already in the faculty handbook.

I wanted to get input on the committee chair requirement. Currently, if you look at who can be a committee chair, it states they must be graduate faculty, teaching faculty, or professors of practice. Research faculty and Emeritus seem to be excluded from being committee chairs. I suggest we revise this to state that the committee chair must be a full member of the new definition of the graduate faculty. The Handbook Committee wanted input from the graduate council on this before it came back to them to make the actual change. Their next meeting will be held on March 6th.

Question: Would this change make it easier or harder?

Answer: It would make it easier. We have noticed that we have people whose title does not match their actual appointment in the university system. For example, someone has a research faculty title but if you look them up in Workday, they are a research associate. It would also create administrative efficiencies within OnBase and the thesis committee form from Banner. This would also allow people who do not have faculty appointments but have the minimum credential to be committee members.

1.3

ELECTRICAL ENGINEERING

Peter Aaen

4 new programs:

[CIM 2/13; PROVOST 2/13]

: PROFESSIONAL ONLINE MASTERS IN
ELECTRICAL ENGINEERING

In the Fall of 2023, President Johnson and Provost Holz, requested that the Electrical Engineering department accelerate the development of an online professional master's degree. This degree and the certificates that comprise it along with similar degrees from Mechanical Engineering and Computer Science are core Mines' goal to increase the number of non-thesis Master's students. The objective is to have between 1500-2000 students taking online master's degrees and profits from our online programs will be re-invested into graduate programs across Mines.

The areas covered by our online program are of great interest to electrical engineers working in local industry and at the national level. This professional master's degree is being offered entirely online and is designed so that students can earn three certificates as they progress through their coursework.

: INFORMATION AND SYSTEM SCIENCES

Data science refers generally to the principles and procedures for modeling, processing, analyzing, and reacting to data from diverse sources. Although the term "data science" is somewhat loosely defined, most tasks in data science draw from one or more of the following disciplines: statistics; machine learning and data mining; signal processing; optimization; computer programming; databases; and domain expertise relevant to the system generating the data (such as a smart grid or a social network).

In response to the challenges of the Big Data era, data science has recently become a major focus area in industry and academia. A number of universities are offering professional Master's degrees under the names of Data Science, Big Data Analytics, and similar names;

many other engineers work with data but may not formally have the job title of data scientist.

These areas are of great interest to working professionals electrical engineers in local industry and at the national level. Such offerings will increase the enrollment of non-traditional students and will increase the number of non-thesis MS students.

This certificate is being offered as an online certificate.

: MICROWAVE ENGINEERING

The field of radio frequency (RF) and microwave engineering is extremely rich in technical content and high in demand in industry, national laboratories, and the military. Unfortunately, despite that the market is actively looking for qualified candidates, not many electrical engineers graduate with a good knowledge and understanding in this area.

RF and microwave engineering is a mature field that draws upon multiple disciplines, and as such, generally courses in this area are offered as senior level electives in an undergraduate electrical engineering (EE) curriculum, and typically without laboratory sessions. Continued growth in the mobile telecommunications market (5G), space-based internet, internet-of-things (IoT), quantum engineering, and increased growth in the semiconductor market (due to the CHIPS act) all require more qualified engineers. This combined with the fact that engineering design is now heavily dependent on computer-aided design (CAD) significantly limits the practical ability of the students in this area.

In response to these workforce challenges, microwave engineering has become a major focus for industry and to bridge this gap between workforce needs and EE education we propose a new online certificate in Microwave Engineering.

This certificate will focus on theoretical aspects of microwave devices, networks, and systems, design and optimization of modern microwave devices, CAD, fabrication technologies, and device and system measurement techniques. This certificate offering is designed to leverage our existing strengths in the Electrical Engineering department and to serve the industries, particularly those in the Denver metropolitan area that deal with RF and microwave devices and systems.

This certificate is being offered as an online-certificate.

: POWER AND ENERGY SYSTEMS

The Future Electric Grid will be smart, with user-interaction, bidirectional power flow because a deep penetration of renewable energy resources will allow electrical power flow among users and the grid. Therefore, system-level dynamics and control need an advanced and high-tech understanding. Students in this Certificate Program will learn about the combined power system and power electronics approach, where enabled renewable energy systems, will interact with the utility grid, establishing microgrids, and intelligence and data communication will make the future grid a Smart-Grid.

These areas are of great interest to working professionals in local industry and at the national level. Such offerings will increase the enrollment of non-traditional students and will increase the number of non-thesis MS students.

This certificate is being offered as an online certificate.

1 new course:

[CIM 2/12; PROVOST 2/12]

EENG598: ADVANCED DIGITAL SIGNAL
PROCESSING

New Advanced DSP class for new online graduate certificate in Information and System Sciences.

This proposal is introducing an Electrical Engineering online professional master's degree. The executive team has put forth a strategy where we really need to grow our master's non-thesis or master's online population. This is seen as a key revenue generation as the university is looking to enroll between 1,500 to 2,000 students in this long term. We have been preparing this for a while. We had multiple certificates that were previously developed but from a residential perspective. For various reasons, including COVID, personnel shortages, etc., we were not able to offer them. Since then, we have hired seven new faculty members, so we have staffed up quite a bit and are now in a good position to start this program. The online professional master's degree will be composed of three stackable certificates. The first certificate is RF/Microwave which is look at how to build antennas, how we do measurements, and how we build communication chips that you might find in your phones and so forth. The second is Power and Energy Systems which is about how we transfer power, generate power, and control it. The last certificate in Information Systems Science which is about processing extracting signals that are gathered. Each certificate is composed of three courses. To make up the 30-credit master's program, we are also going to combine these courses with a Mathematics course from the Mechanical Engineering department that is already offered online (MEGN502). Students will have the option to take all 30 credits or go through the individual certificates. We have run this through our Industrial Advisory Board and received support. Some local companies are very interested in specific areas. We are now developing and putting together all those courses. Currently, we are working with the advertising team, marketing, registrar, and so forth to advertise the program as soon as possible if we get approved. We are still working on the optimization for the deployment phase in terms of which courses and what sequences, so that is something we are working on with Mines Online and the marketing team. These will be a series of 8-week courses and the idea is students can take each certificate in sequence with one course after the other. Based on feedback from OGS, students can be awarded each certificate once completed or take the math course and receive the master's degree.

Comment: The Mechanical Engineering department is planning extensive revision of the curriculum for MEGN502 by integrating linear algebra. This is something that I think we need to discuss to make sure that this course fits within the curriculum.

Question: Will this be approved in time to be presented to the Board of Trustees?

Answer: During the Faculty Senate meeting, we discussed that if this program gets approved, we can get this presented to the Board of Trustees in the summer. We will try to accelerate the process of approval to get this presented in time.

Question: I noticed that Library is listed as N/A. It is always a concern to the library whenever a program is offered online and making sure we have enough resources available to students, particularly when it comes to course readings. We have been really trying to develop that as much as we can. When it is online, that restricts how much is available to students.

Answer: For a lot of our courses, we are trying to use a lot of open access resources. So, for example, in a few of the courses in the RF/Microwave certificate, we are using some free textbooks that are available for license. For those reasons, I think most of the work will be either a free resource or following a specific textbook, so I am not anticipating a large need here for library usage. There may be a few links to a few papers that the students could then access such as IEEE Xplore. We can make sure to stay within the

repositories that we already have so I don't think we are going to be requesting anything new if that is the concern.

Question: I am assuming students will have research projects in these courses. Are you saying that you are not going to encourage those students to use library resources?

Answer: No, we will definitely not discourage students from using library resources. In terms of course content, we will be following either open access books or books students can easily get access to for any research resources. We will encourage them to use the existing collections that we have now. A lot of the courses we have already built are either mirroring or leveraging existing resources that we already have for our residential program. That is why I am not anticipating a large need for new resources.

Comment: The library has noticed that when new classes and programs get introduced, funds are not being requested to go to the library. However, the library still must take that on and back pay. I highly encourage you and others that may be up for offering new programs to put in some resources for the library so that we know what is going to be used and we know if can be covered. We want to make sure we have the most up-to-date content available to our users whether it be faculty or students. If students are using existing resources, it is not so much about funds but about letting the library know that it is important. It is hard for the library to know what people are using. If it is new content (books, journals, databases, etc.), it would be important for the library to know where students are going to do their research and what kind of resources they are going to use. Preferably, the library needs to know prior to the courses to avoid mid-semester requests.

Question: I wanted to clarify that if a student is admitted as a master's student, they will not be allowed to get a certificate?

Answer: This is a policy coming out of OGS. If a student is going to take a certificate, they can go ahead and jump from one certificate to the next and build up in that manner. But the idea is, if they register for the master's program, they will not be awarded the certificates. This is in place to avoid people coming into OGS two months before their master's degree is awarded and asking for these certificates as well because they have not been admitted to them. There is a lot of administrative burden on OGS to be able to award these, so we will say students can either stack certificates for the master's degree or they must apply to the certificate to earn the certificate. We might also place rules around that that students must be admitted to the certificate program before the courses are completed for it. However, this is still in a state of discussion.

Question: How many of these classes already exist in the in-person modality or are you developing all these new?

Answer: Seven of the courses already exist in the residential modality and three of them will be new.

Question: Are you going to offer the classes both online and residential, or are you going to make residential students take online courses?

Answer: Our policy will be if you are in a residential degree, you can take residential courses. However, the students, should they choose to, can take an online course if they would like. The same would apply to an online student. However, there is a threshold of 50%. If a student is residential, they cannot take more than 50% of their program online and vice versa. We will continue to make sure that out students in both modalities are well served.

1.4

COMPUTER SCIENCE

Dong Chen

1 program change:

[CIM 1/18]

MSPHD-CS: MS & PHD IN COMPUTER SCIENCE

CSCI406 and CSCI442 are being taken out of the core course requirements for the MS and PhD so we are abiding by the HLC guidelines. Changing combined program minimum GPA to 3.0

undergraduates) with training in key atmospheric processes relevant to society and the environment. Course materials cover many physical processes relevant to extreme conditions and the projected changes facing society.

2.2

SPACE RESOURCES

Angel Abbud-Madrid

[CIM 1/30; Provost 1/30]

1 new course:

SPRS508: REGOLITH PROPERTIES AND PROCESSING

The Space Resources online graduate program is the first one in the world educating scientists, engineers, economists, entrepreneurs, and policy makers in the field of space resources. This one-of-a-kind, innovative, multidisciplinary program aims to take the 150-year-old, world-renowned expertise at Mines in resource exploration, extraction, production, and utilization to its next frontier by identifying, extracting, and using resources beyond Earth. This online course provides a deep look at regolith, the layer of unconsolidated rock debris that covers nearly every planetary body in the solar system. Students will gain detailed knowledge of how regolith forms and what its properties are on the Moon, Mars, and asteroids. In addition, practical aspects will be also covered of how regolith will be used in space resources, and how its properties influence the engineering systems that will interact with this material.

2 course changes:

SPRS503: SPACE RESOURCES SEMINAR

Change the course delivery from an 8 week to full term (16 week) course. To better serve the students in the program and increase accessibility.

SPRS591: SPACE RESOURCES PROJECT I

We are changing the course credits for SPRS594 Space Resources Project I from 2.0 credits to 3.0 credits. The reason why we would like to increase the number of hours is because the amount of material covered, and its deliverables, correspond to a 3-credit-hour course load. The prerequisites of SPRS501 and SPRS502 are being added so that students are fully prepared before taking this course. The content and course description assumes having taken these courses, but they were not formally included as prerequisites. This change will decrease confusion and increase student success in the course.

1 program change:

XCRTGMSPHD-SPRSO: GRAD CERT, MS, & PHD IN SPACE RESOURCES

Clarifies the program requirements, especially for students doing a thesis, and updates the course offerings.

4:55-5:00 pm **Adjourn**

Next meeting: February 21, 2024, 4:00-5:00 via Zoom. Please send all agenda items to Soutir Bandyopadhyay (sbandyopadhyay@mines.edu) and Kristeen Serracino (kristeen.serracino@mines.edu) 1 week in advance

Consent Agenda The following proposals will not be discussed unless specifically requested by the Council. Please review the following items. With no objections, approval is implied, and items will be processed accordingly.

- 3.1 CEEN** Lori Tunstall
 [CIM 1/24]
1 course deactivation: CEEN540: ADVANCED DESIGN OF STEEL STRUCTURES
This course has been moved to a new course number by the CEE department. It was requested that this course be deactivated.
- 3.2 COMPUTER SCIENCE** Dong Chen
 [CIM 2/2]
5 course change: CSCI532: ROBOT ETHICS
Cross-list with ROBO572 per Dr. Petruska.
- CSCI534: ROBOT PLANNING AND MANIPULATION
Cross-list with ROBO534 per Dr. Petruska.
- CSCI536: HUMAN-ROBOT INTERACTION
Cross-list with ROBO576 per Dr. Petruska.
- CSCI573: ROBOT PROGRAMMING AND PERCEPTION
Cross-list with ROBO513 per Dr. Petruska.
- CSCI575: ADVANCED MACHINE LEARNING
Cross-list with ROBO535 per Dr. Petruska.
- 3.2 ELECTRICAL ENGINEERING** Yamuna Phal
 [CIM 2/2]
1 course change: EENG517: THEORY AND DESIGN OF AVANCED CONTROL S YSTEMS
Cross-list with ROBO567 per Dr. Petruska.
- 3.3 MECH** Owen Hildreth
 [CIM 2/2]
1 course change: MEGN545: ADVANCED ROBOT CONTROL
Cross-list with ROBO565 per Dr. Petruska.
- 3.4 UCTE** Gabriel Walton
1 program change:
 [CIM 2/12]
 MSPHD-UEEG: MS & PHD IN UNDERGROUND CONSTRUCTION AND TUNNELING ENGINEERING
 Bringing program into alignment with guidelines to no longer have UG courses be part of a graduate degree.

3.5

1 program change:

XCRTG-NRGeo: GRADUATE CERTIFICATE
IN ENERGY GEOPHYSICS

Adding an additional class (SYGN 598 - Introduction to Geothermal Resources) to the certificate to offer more diverse options for those interested in the program.

4.1

Approval of Minutes – February 7, 2024

Soutir Bandyopadhyay