

# University Honors and Scholars Programs

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## University Honors & Scholars Programs

University Honors and Scholars Programs (UHSP) cultivate a signature student experience beyond the traditional boundaries of the classroom and across learning communities. UHSP's mission is to offer curricular and co-curricular honors and scholars experiences for students seeking opportunities to shape a distinctive undergraduate pathway that will challenge them, help them grow, build connections, and develop adaptability beyond their technical degrees. UHS programs develop the professional and interpersonal skills engineers and scientists need to succeed in their professions and to make an impact in their various communities. By emboldening interdisciplinary collaboration and experiential learning, UHS programs foster critical thinking, leadership, creativity and innovation. UHSP opportunities are open to all students and include: interdisciplinary honors pathways, immersive co-curricular scholars activities, distinct hands-on curricular-based research and mentorship, and STEM-Ed teaching.

UHS Programs:

- Thorson First-Year Honors Experience
- Grandey First-Year Honors Experience
- McBride Honors Program in Public Affairs
- Grand Challenges Scholars Program
- Undergraduate Research Scholars
- Teach@Mines
- Nationally Competitive Scholarships

Visit the University Honors and Scholars Programs website:  
[honors.mines.edu](http://honors.mines.edu)

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## Thorson First-Year Honors Experience

The Thorson First-Year Honors Experience is a unique and collaborative approach to learning that uses real-world problems to introduce students to the roles engineers and scientists play in a fast-changing world. Working closely with some of the best teachers across the humanities, engineering, and sciences, students in the Honors community come to see how the global challenges of the future require innovative and creative thinking.

The curricular component of the Thorson First-Year Honors Experience is a 2-semester interdisciplinary course sequence called IDEAS – Innovation and Discovery in Engineering, Arts, and Sciences. In IDEAS, students explore critical and creative thinking, design, and ethical problem-solving through a multitude of lenses: they learn to think like an artist, an engineer, a designer, a poet, and a scientist.

The course sequence fulfills core curriculum requirements for all majors by replacing two required core courses (HASS 100 Nature and Human Values and EDNS 151 Design I).

We believe a world of IDEAS is also a world worth exploring, and each year we offer new and different opportunities within and beyond the course. We aspire to provide all our students with the chance to enrich their first-year at Mines in unique ways. Through community engagement

opportunities, project-based learning, and teamwork Thorsonites investigate the intersection of art, design, culture, and society. Co-curricular components of the program include local field trips, community events, and opportunities for education outside the classroom. Through all of these curricular and co-curricular experiences and interactions, learning extends beyond the classroom into the lasting friendships that students develop over the course of their first-year.

**Courses:**

### **HNRS105. INNOVATION AND DISCOVERY IN ENGINEERING, ARTS, AND SCIENCES I. 3 Semester Hrs.**

(I) (WI) "Innovation and Discovery in Engineering, Arts, and Sciences" (IDEAS) applies honors pedagogies in a multidisciplinary, integrated environment that highlights the seamless boundaries between science and engineering, design, ethics, and the arts as a path toward making value-informed design decisions. In addition to developing foundational skills in engineering design and problem-solving, students examine place, identity, and community in various contexts as they learn what it means to be an engaged and mindful citizen and professional. IDEAS poses ethical problems and hands-on design challenges from a multitude of lenses. It incorporates experiential learning, team-based projects, and seminar discussions to encourage students to think both critically and creatively about their world. In order to move on to HNRS 115, HNRS 105 must be completed with a C- or better. Students must pass both HNRS 105 and HNRS 115 to meet degree requirements. If students drop either of these courses, they must take both HASS 100 and EDNS 151 or their equivalents in order to graduate. 2 hours studio; 1 hour seminar; 3 semester hours.

### **HNRS115. INNOVATION AND DISCOVERY IN ENGINEERING, ARTS, AND SCIENCES II. 4 Semester Hrs.**

(II) (WI) "Innovation and Discovery in Engineering, Arts, and Sciences" (IDEAS) applies honors pedagogies in a multidisciplinary, integrated environment that highlights the seamless boundaries between science and engineering, design, ethics, and the arts as a path toward making value-informed design decisions. Students examine place, identity, and community in various contexts as they learn what it means to be an engaged and mindful citizen and professional. IDEAS poses ethical problems and hands-on design challenges from a multitude of lenses. It incorporates experiential learning, team-based projects, and seminar discussions to encourage students to think both critically and creatively about their world. Students must pass both HNRS 105 and HNRS 115 to meet degree requirements. If students drop either of these courses, they must take both HASS 100 and EDNS 151 or their equivalents in order to graduate. Prerequisites: HNRS 105. 3 hours studio; 1 hour seminar; 3 semester hours.

Visit the Thorson website: [thorson.mines.edu](http://thorson.mines.edu)

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## Grandey First-Year Honors Experience

The Grandey First-Year Honors Experience is an innovative, collaborative, and interdisciplinary way to start building your capabilities to address the world's complex challenges through leadership, communication, ethics, systems thinking, innovation, and design. Some of the best humanities, engineering, and design faculty will be your guides as you focus on the four themes of the National Academy of Engineering's Grand Challenges Scholars Program: Sustainability, Secure Living, Health, and Joy of Living.

The curricular component of the Grandey First-Year Honors Experience is a 2-semester interdisciplinary course sequence called Leadership by Design. This course sequence fulfills core curriculum requirements for all majors by replacing two required core courses (HASS 100 Nature and Human Values and EDNS 151 Cornerstone Design I). Students experience a combination of experiential learning, interdisciplinary projects, seminar discussions, guest speakers, and design sprints as they grow as leaders, designers, communicators, systems thinkers, collaborators, and innovators. Coursework enables students to learn how to design for people, cultivate innovative mindsets, find their own way to lead, build communication abilities, develop professional skills, and think creatively. Learning extends beyond the classroom through experiences such as local field trips, community events and socials, and leadership workshops. Being part of the Grandey community and taking part in these experiences will help students create some lasting friendships that students develop over the course of their first year at Mines. They also move on after their first year with "tools" to keep growing such as knowing processes for designing for big problems, thinking systematically, asking better questions, working as a team, communicating well in several ways, and cultivating creativity. The Grandey First-Year Honors Experience is a unique and collaborative approach.

### Courses:

**HNRS 110. LEADERSHIP BY DESIGN I (I) (WI)** In the first of two semesters of this honors experience, students participate in a multidisciplinary, integrated, collaborative environment that blends leadership, design, communication, innovation, and ethics in order to build the capabilities needed to lead and address grand challenges. Students will experience a combination of experiential learning, projects, seminar discussions, guest speakers, and design sprints as they spend time gaining foundational knowledge, learning how to think in systems, analyzing grand challenges, communicating "the story" in multiple ways to various audiences, and designing documents, presentations, objects, and exhibitions while developing their portfolio. In order to move on to HNRS 120, HNRS 110 must be completed with a C- or better. If students drop either of these courses, they must take both HASS 100 and EDNS 151 or their equivalents in order to graduate. 2 hours studio; 1 hour seminar; 3 semester hours. Students must pass both HNRS110 and HNRS120 to meet degree requirements.

**HNRS 120 – LEADERSHIP BY DESIGN II (II) (WI)** In the second of two semesters of this honors experience, students participate in a multidisciplinary, integrated, collaborative environment that blends leadership, design, communication, innovation, and ethics in order to build the capabilities needed to lead and address grand challenges. Students experience a combination of experiential learning, projects, seminar discussions, guest speakers, and design sprints. Students build on the first semester as they advance leadership skills and work to be better designers, creators, thinkers, innovators, and communicators. They will address the questions "What is good design?" "What is good leadership?" "What is innovation?" and "How do I best tell

a select number of students the opportunity to cross the boundaries of their technical expertise into the ethical, cultural, socio-political, and environmental dimensions of human life. Students will develop their skills in communication, critical thinking, and leadership through seminar-style classes that explore diverse aspects of the human experience. The seminars are designed to offer coherent perspectives across the curriculum, allowing for a maximum degree of discussion and debate on complex topics. Themes, approaches, and perspectives from the humanities and the social sciences are integrated with science and engineering perspectives to develop in students habits of thought necessary for a comprehensive understanding of societal and cultural issues that enhance critical thinking, social responsibility, and enlightened leadership.

Please see the Guy T. McBride, Jr. Honors Program in Interdisciplinary Minors for more details about this program.

Visit the McBride website: [mcbride.mines.edu](http://mcbride.mines.edu)

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## Grand Challenges Scholars Program

The Grand Challenges Scholars Program (GCSP) prepares students to be world-changers and impact-makers. The GCSP offers a way to combine coursework, extracurricular activities, and experiences that prepare you to address complex socio-technical issues, such as the National Academy of Engineering (NAE) Grand Challenges and the United Nations Sustainable Development Goals, while receiving certification from the NAE and a scholars designation at graduation. As a scholar, you will have the chance to choose your own pathways to gain skills in interdisciplinary thinking, working across diverse cultures, applying engineering and science in the service of others, entrepreneurship, and addressing problems through design, research, and creativity.

Visit the Grand Challenge Scholars Program website at [grandchallenges.mines.edu](http://grandchallenges.mines.edu)

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## Undergraduate Research Scholars

Undergraduate Research Scholars (URS) is a valuable resource for all undergraduate students interested in engaging in a research opportunity. URS assists students in all the stages of the research life cycle—from identifying research projects to helping students share their work. A few focus areas of URS include:

### Providing enhanced funding opportunities for undergraduate students:

URS awards funding to undergraduate students through three signature programs: FIRST, MURF, and SURF. These opportunities are open to students of all disciplines. First-year Innovation and Research Scholar Training (FIRST) is designed to recruit incoming first-year students and transfer students to participate in research and support them throughout the first and second semesters on campus. FIRST scholars enroll in the 1-credit course HNRS 150: Entering Research in the fall semester. In this course, students will be introduced to various skills needed to be successful when conducting research. These skills include, best practices to finding a research mentor, the roles and responsibilities of a researcher, developing relationships that make for a successful research experience, how to critically read and analyze scientific literature, lab

safety, and disseminating research work. FIRST applications open in June, and students can apply through the undergraduate research website.

Mines Undergraduate Research Fellowship (MURF) provides an opportunity for any undergraduate student to work on a research project proposed by a faculty mentor during the fall and spring semesters. Applications open in April, and students can apply through the undergraduate research website.

Summer Undergraduate Research Fellowship (SURF) program at Mines seeks to provide funding for current Mines undergraduate students to participate in concentrated, full-time research under the mentorship of the Mines faculty during the summer semester.

#### **Promoting and recognizing undergraduate research campus-wide:**

URS helps showcase and celebrate undergraduate research by providing a platform for students to disseminate their research at the annual Undergraduate Research Symposium held on the Mines campus and the Mines Undergraduate Research Journal, Reuleaux.

#### **Providing professional development and networking opportunities for undergraduate researchers:**

URS offers bi-weekly seminars on topics of interest to undergraduate researchers through the Emerging Scholar Seminar Series. In addition, undergraduate students with two or more semesters of research experience can apply to be an Undergraduate Research Ambassador and help guide other students interested in research.

Visit the Undergraduate Research Scholars website at [mines.edu/undergraduate-research/](http://mines.edu/undergraduate-research/)

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## **Teach@Mines**

Teach@Mines offers courses, a Teaching Minor, advising, and information on certification pathways to help you explore and learn more about the teaching profession.

Teach@Mines is tailored specifically to the needs of Mines students and alumni, with non-traditional pathways towards licensure.

We offer courses and a Teaching Minor for students to both try out teaching and to prepare to teach (K-12 or college). A person can start on this path at any point in their Mines career as an undergraduate, graduate student, or as a Mine's alumni. The earlier you begin, the more flexibility you have.

Please see the Teach@Mines Interdisciplinary Minor for more details about this program.

Visit the Teach@Mines website at [mines.edu/teacherprep/](http://mines.edu/teacherprep/)

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### **HNRS105. INNOVATION AND DISCOVERY IN ENGINEERING, ARTS, AND SCIENCES I. 3.0 Semester Hrs.**

(I) (WI) "Innovation and Discovery in Engineering, Arts, and Sciences" (IDEAS) applies honors pedagogies in a multidisciplinary, integrated environment that highlights the seamless boundaries between science and engineering, design, ethics, and the arts as a path toward making value-informed technical decisions. In addition to developing foundational skills in engineering design and problem-solving, students examine place, identity, citizenship, and community in various contexts as they learn what it means to be an engaged and mindful citizen and professional. IDEAS poses ethical problems and hands-on design challenges from a multitude of lenses. It incorporates experiential learning, team-based projects, and seminar discussions to encourage students to think both critically and creatively about their world. Students must pass both HNRS105 and HNRS 115 to meet degree requirements. If students drop either of these courses, they must take both HASS100 and EDNS151 or their equivalents in order to graduate.

### **HNRS110. LEADERSHIP BY DESIGN I. 3.0 Semester Hrs.**

In the first of two semesters of this honors experience, students participate in a multidisciplinary, integrated, collaborative environment that blends leadership, design, communication, innovation, and ethics in order to build the capabilities needed to lead and address grand challenges. Students will experience a combination of experiential learning, projects, seminar discussions, guest speakers, and design sprints as they spend time gaining foundational knowledge, learning how to think in systems, analyzing grand challenges, communicating the story in multiple ways to various audiences, and designing documents, presentations, objects, and exhibitions. Also, students will begin to develop their portfolio to document the story of their time in Leadership by Design. Students must pass both HNRS110 and HNRS120 to meet degree requirements.

### **HNRS115. INNOVATION AND DISCOVERY IN ENGINEERING, ARTS, AND SCIENCES II. 4.0 Semester Hrs.**

(II) (WI) "Innovation and Discovery in Engineering, Arts, and Sciences" (IDEAS) applies honors pedagogies in a multidisciplinary, integrated environment that highlights the seamless boundaries between science and engineering, design, ethics, and the arts as a path toward making value-informed technical decisions. Students examine place, identity, citizenship, and community in various contexts as they learn what it means to be an engaged and mindful citizen and professional. IDEAS poses ethical problems and hands-on design challenges from a multitude of lenses. It incorporates experiential learning, team-based projects, and seminar discussions to encourage students to think both critically and creatively about their world. Students must pass both HNRS105 and HNRS115 to meet degree requirements. If students drop either of these courses, they must take both HASS100 and EDNS151 or their equivalents in order to graduate. Prerequisite: HNRS105 with a grade of C- or higher.

**HNRS120. LEADERSHIP BY DESIGN II. 3.0 Semester Hrs.**

In the second of two semesters of this honors experience, students participate in a multidisciplinary, integrated, collaborative environment that blends leadership, design, communication, innovation, and ethics in order to build the capabilities needed to lead and address grand challenges. Students will experience a combination of experiential learning, projects, seminar discussions, professional development workshops, guest speakers, and design sprints. Students build on the first semester as they build leadership skills and work to be better designers, creators, thinkers, innovators, and communicators. They will address the questions "What is good design?" "What is good leadership?" "What is innovation?" and "How do I best tell the story?" Students design documents, presentations, and objects. They investigate ways to create impact and value as they define problems, pose solutions for grand challenges, and create a portfolio to document their experience to best tell the story of their time in Leadership by Design. Students must pass both HNRS110 and HNRS120 to meet degree requirements. Prerequisite: HNRS110 with a grade of C- or better.

**HNRS150. ENTERING RESEARCH. 1.0 Semester Hr.**

In this course, students will be introduced to various skills needed to be successful when conducting research. These skills include best practices to finding a research mentor, the roles and responsibilities of a researcher, developing relationships that make for a successful research experience, how to critically read and analyze scientific literature, lab safety, and disseminating research work.

**HNRS198. SPECIAL TOPICS. 6.0 Semester Hrs.**

A Special Topics course will be a pilot course in the UHSP curriculum or will be offered as an enhancement to regularly-scheduled UHSP seminars. Special Topics courses in the UHSP curriculum will not be offered more than twice. Variable credit: 1 - 6 semester hours. Repeatable for credit under different titles.

**HNRS199. INDEPENDENT STUDY. 1-6 Semester Hr.**

Under special circumstances, a UHSP student may use this course number to register for an independent study project which substitutes for or enhances the regularly-scheduled UHSP curriculum seminars. Variable credit: 1 - 6 semester hours. Repeatable for credit.

**HNRS298. SPECIAL TOPICS. 1-6 Semester Hr.**

A Special Topics course will be a pilot course in the UHSP curriculum or will be offered as an enhancement to regularly-scheduled UHSP seminars. Special Topics courses in the UHSP curriculum will not be offered more than twice. Variable credit: 1 - 6 semester hours. Repeatable for credit under different titles.

**HNRS299. INDEPENDENT STUDY. 1-6 Semester Hr.**

Under special circumstances, a UHSP student may use this course number to register for an independent study project which substitutes for or enhances the regularly-scheduled UHSP curriculum seminars. Variable credit: 1 - 6 semester hours. Repeatable for credit.

**HNRS305. EXPLORATIONS IN MODERN AMERICA. 3.0 Semester Hrs.**

(I, II) (WI) Honors core course that develops student skills in reading, writing, critical thinking, and oral communication. skills through the exploration of selected topics related to the social, cultural, and political ideas and events that have shaped the development of the modern United States and its role in the world. Prerequisite: Admission to the Program and HASS100. 3 lecture hours, 3 credit hours.

**HNRS315. EXPLORATIONS IN THE MODERN WORLD. 3.0 Semester Hrs.**

(I, II) (WI) Honors core course that develops student writing skills and critical thinking abilities through the exploration of selected topics related to the social, cultural, and political ideas and developments that have shaped the modern world. Prerequisite: Admission to the Program and HASS100. 3 lecture hours, 3 credit hours.

**HNRS398. SPECIAL TOPICS IN THE UNIVERSITY HONORS AND SCHOLARS PROGRAM. 1-6 Semester Hr.**

A Special Topics course will be a pilot course in the University Honors & Scholars Programs curriculum or will be offered as an enhancement to regularly-scheduled UHSP seminars. Special Topics courses in the UHSP curriculum will not be offered more than twice.

**HNRS399. INDEPENDENT STUDY. 1-6 Semester Hr.**

Under special circumstances, a UHSP student may use this course number to register for an independent study project which substitutes for or enhances the regularly-scheduled UHSP curriculum seminars. Variable credit: 1 - 6 semester hours. Repeatable for credit.

**HNRS405. MCBRIDE PRACTICUM. 1-3 Semester Hr.**

(I, II) (WI) With approval of the Program, a McBride student may enroll in an individualized study project which substitutes for or enhances the regularly-scheduled McBride curriculum seminars. This option may be used to pursue an approved foreign study program, service learning program, international internship, undergraduate research project, or other authorized experiential learning program of study. Students must also prepare a faculty-guided major research paper that integrates the experience with the goals, objectives, and focus of the Honors Program in Public Affairs. 1-3 semester hours. Repeatable up to 6 hours.

**HNRS425. EXPLORATIONS IN POLITICS, POLICY, AND LEADERSHIP. 3.0 Semester Hrs.**

(I, II) (WI) Study of selected topics related to policy, politics, and/or leadership through case studies, readings, research, and writing. Prerequisites: HNRS305: Explorations in Modern America and HNRS315: Explorations in The Modern World. Repeatable for credit up to a maximum of 6 hours. 3 lecture hours, 3 credit hours.

**HNRS430. EXPLORATIONS IN IDEAS, ETHICS, AND RELIGION. 3.0 Semester Hrs.**

(I, II) (WI) Study of selected topics related to ideas, ethics, and/or religion through case studies, readings, research, and writing. Prerequisites: HNRS305: Explorations in Modern America and HNRS315: Explorations in the Modern World. Repeatable for credit up to a maximum of 6 hours. 3 lecture hours, 3 credit hours.

**HNRS435. EXPLORATIONS IN CULTURE, SOCIETY, AND CREATIVE ARTS. 3.0 Semester Hrs.**

(I, II) (WI) Study of selected topics related to culture, society, and/or the creative arts through case studies, readings, research, and writing. Prerequisites: HNRS305: Explorations in Modern America and HNRS315: Explorations in the Modern World. Repeatable for credit up to a maximum of 6 hours. 3 lecture hours, 3 credit hours.

**HNRS440. EXPLORATIONS IN INTERNATIONAL STUDIES & GLOBAL AFFAIRS. 3.0 Semester Hrs.**

(I, II) (WI) Study of selected topics related to international studies and/or global affairs through case studies, readings, research, and writing. Prerequisites: HNRS305: Explorations in Modern America and HNRS315: Explorations in the Modern World. Repeatable for credit up to a maximum of 6 hours. 3 lecture hours, 3 credit hours.



**HNRS445. EXPLORATIONS IN SCIENCE, TECHNOLOGY, AND SOCIETY. 3.0 Semester Hrs.**

(I, II) (WI) Study of selected topics related to the relationships between science, technology, and society through case studies, readings, research, and writing. Prerequisites: HNRS305: Explorations in Modern America and HNRS315: Explorations in the Modern World. Repeatable for credit up to a maximum of 6 hours. 3 lecture hours, 3 credit hours.

**HNRS450. EXPLORATIONS IN EARTH, ENERGY, AND ENVIRONMENT. 3.0 Semester Hrs.**

(I, II) (WI) Study of selected topics related to earth, energy, and/or the environment through case studies, readings, research, and writing. This course may focus on the human dimensions or broader impacts of science, technology, engineering, or mathematics. Prerequisites: HNRS305: Explorations in Modern America and HNRS315: Explorations in the Modern World. Repeatable for credit up to a maximum of 6 hours. 3 lecture hours, 3 credit hours.

**HNRS476. COMMUNITY ENGAGEMENT THROUGH SERVICE LEARNING. 3.0 Semester Hrs.**

(II) Community Engagement through Service Learning combines a traditional classroom environment with an off campus learning experience with a local non-profit or community organization. Students spend 3-4 hours per week serving the organization they choose and meet in class once per week to discuss reading assignments, present research findings, and share experiences and insights about the course material. Instructors may choose to focus on a particular topic or social issue, such as poverty and privilege, or may engage with community issues more broadly. The course focuses on several aspects of a student's learning, including intra- and interpersonal learning, discovering community, and developing communication skills and critical and interdisciplinary approaches. Course work will focus on critical reading, group discussion and deliberation, oral presentations of research, and writing assignments. Prerequisites: none. 2 hours lecture; 3-4 hours lab; 3.0 semester hours.

**HNRS496. PAYNE SCHOLARS PROGRAM. 1.0 Semester Hr.**

Mines graduates often go on to become corporate leaders and are responsible for many of the innovations and changes seen across industries. In much the same way, the research done at Mines has far reaching implications for many of the social, economic, and environmental challenges faced around the world. To develop these relationships, and to prepare students for future roles, the Payne Institute partnered with students to develop a public policy community that uses all the School of Mines' resources to be both physical and social engineers of the world around them. One of the most prominent ways we do this is through the Payne Scholars program. This one-credit course helps students perform research, collaborate across campus, and engage with a broad network of international experts on global policy challenges. Students are taught how to write academic papers on the important issues we are facing today, and once the students finish the course, the papers they write can be published as Payne Commentaries on our website. We often sponsor students for internships, or offer student worker positions to continue their work. This often means that they get to be co-authors on peer-reviewed academic papers or help us build world-shaping policy.

**HNRS498. SPECIAL TOPICS IN THE MCBRIDE HONORS PROGRAM IN PUBLIC AFFAIRS. 1-6 Semester Hr.**

A Special Topics course will be a pilot course in the McBride curriculum or will be offered as an enhancement to regularly-scheduled McBride seminars. Special Topics courses in the McBride curriculum will not be offered more than twice. Variable credit: 1 - 6 semester hours. Repeatable for credit under different titles.

**HNRS499. INDEPENDENT STUDY. 1-6 Semester Hr.**

Under special circumstances, a McBride student may use this course number to register for an independent study project which substitutes for or enhances the regularly-scheduled McBride curriculum seminars. Variable credit: 1 - 6 semester hours. Repeatable for credit.

**MAED262. K-12 FIELD EXPERIENCE AND BUILDING STUDENT RELATIONSHIPS. 1.0 Semester Hr.**

This course is designed to provide Mines students with opportunities to participate in, analyze, and reflect on issues in a mathematics or computer science K-12 school classroom setting. The overall goal is for Mines students to understand who their students are, build relationships, and begin exploring learner development and learner differences. Specifically, the course will focus on developing Mines students' ability to identify and practice basic classroom management, differentiate instruction, ask probing questions, mathematics or computer science content preconceptions, language/activities that promote a growth mindset, and professional language. Furthermore, Mines students will begin exploring the factors that shape school norms and culture. In addition to an on-campus seminar, there is a 25-hour field experience requirement in the student's assigned partner school.

**MAED405. MATHEMATICAL PRACTICES AND THE SOCIAL CONTEXT OF MATHEMATICS. 3.0 Semester Hrs.**

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. These skills will be modeled, practiced and mastered in the context of authentic mathematical practices (eg. the formation of the quadratic equation through maximization of orange production). Teacher candidates will engage as learners, reflect as practitioners, and finally develop their own 3-day mini-unit. To promote candidates awareness of the social context of mathematics, candidates will explore the historical development of content and perspectives from diverse cultures. In addition this course will prepare students to be able to communicate effectively in a variety of mediums (written, oral, and digital) as educators about mathematical processes and practices.

**MAED425. PRE-ALGEBRA AND ALGEBRA TEACHING TECHNIQUES. 3.0 Semester Hrs.**

In this course teacher candidates will be exposed to evidence-based instructional practices to support students learning of pre-algebra and algebra and model meaningful learning opportunities, common misconceptions and ways of thinking, and students learning progressions (i.e., content trajectory). The goal of this course is for teacher candidates is to develop an awareness of 1) the common misconceptions and learning progressions associated with pre-algebra and algebra; 2) students learning progressions in pre-algebra and algebra, and 3) evidence-based and meaningful instructional strategies for pre-algebra and algebra. The teacher candidate analyzes conceptual algebra underpinnings, common misconceptions, and students' ways of thinking to create opportunities to learn.

**MAED435. COMPUTER SCIENCE TEACHING TECHNIQUES. 3.0 Semester Hrs.**

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. These skills will be modeled, practiced and mastered in the context of authentic CS practices (e.g., the development of websites and computer programs that analyze datasets). Teacher candidates will engage as learners, reflect as practitioners, and finally develop their own 3-day mini-unit. To promote candidates' awareness of the social and ethical context of CS, candidates will explore the historical development of content and perspectives from diverse cultures. In addition, this course will prepare students to be able to communicate effectively in a variety of mediums (written, oral, and digital) as educators about CS concepts, processes, and practices. Prerequisite: CSCI101, CSCI261.

**MAED464. CAPSTONE CURRICULUM DESIGN I. 3.0 Semester Hrs.**

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. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is a 100-hour field experience requirement in the students assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction as well as participate in other school related professional roles and will develop a mini-work sample (min-unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection). Prerequisite: MAED262, SCED333, SCED363, MAED405, MAED425 or MAED435 with a grade of C or higher.

**MAED465. CAPSTONE CURRICULUM DESIGN II. 6-12 Semester Hr.**

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. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is a 32-hour per credit hour enrolled field experience requirement in the students assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction for each 3 credit hours enrolled as well as participate in other school related professional roles and will develop a mini-work sample (min-unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection). Prerequisite: MAED464 with a grade of C or higher.

**MAED505. MATHEMATICAL PRACTICES AND THE SOCIAL CONTEXT OF MATHEMATICS. 3.0 Semester Hrs.**

n/a.

**MAED525. PRE-ALGEBRA AND ALGEBRA TEACHING TECHNIQUES. 3.0 Semester Hrs.**

In this course teacher candidates will be exposed to evidence-based instructional practices to support students' learning of pre-algebra and algebra and model meaningful learning opportunities, common misconceptions and ways of thinking, and students' learning progressions (i.e., content trajectory). The goal of this course is for teacher candidates is to develop an awareness of 1) the common misconceptions and learning progressions associated with pre-algebra and algebra; 2) students learning progressions in pre-algebra and algebra, and 3) evidence-based and meaningful instructional strategies for pre-algebra and algebra. The teacher candidate analyzes conceptual algebra underpinnings, common misconceptions, and students' ways of thinking to create opportunities to learn.

**MAED535. COMPUTER SCIENCE TEACHING TECHNIQUES. 3.0 Semester Hrs.**

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. These skills will be modeled, practiced and mastered in the context of authentic CS practices (e.g., the development of websites and computer programs that analyze datasets). Teacher candidates will engage as learners, reflect as practitioners, and finally develop their own 3-day mini-unit. To promote candidates' awareness of the social and ethical context of CS, candidates will explore the historical development of content and perspectives from diverse cultures. In addition, this course will prepare students to be able to communicate effectively in a variety of mediums (written, oral, and digital) as educators about CS concepts, processes, and practices. Prerequisites: CSCI101, CSCI260.

**MAED562. K-12 FIELD EXPERIENCE AND BUILDING STUDENT RELATIONSHIPS. 1-3 Semester Hr.**

This course is designed to provide Mines students with opportunities to participate in, analyze, and reflect on issues in a mathematics or computer science K-12 school classroom setting. The overall goal is for Mines students to understand who their students are, build relationships, and begin exploring learner development and learner differences. Specifically, the course will focus on developing Mines students' ability to identify and practice basic classroom management, differentiate instruction, ask probing questions, mathematics or computer science content preconceptions, language/activities that promote a growth mindset, and professional language. Furthermore, Mines students will begin exploring the factors that shape school norms and culture. In addition to an on-campus seminar, there is a 25-hour field experience requirement in the student's assigned partner school.

**MAED564. CAPSTONE CURRICULUM DESIGN I. 3.0 Semester Hrs.**

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. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is an approximately 6 hours per week (100-hours total) field experience requirement in the student's assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction as well as participate in other school related professional roles and will develop a mini-work sample (min-unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection). Prerequisites: Completion of MAED562, SCED533, SCED563, MAED505 and MAED525 or MAED535 with a grade of B- or higher in each course.

**MAED565. CAPSTONE CURRICULUM DESIGN II. 6-12 Semester Hr.**

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. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is a 2 hours per week (32-hours total) per credit hour enrolled field experience requirement in the student's assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction for each 3 credit hours enrolled as well as participate in other school related professional roles and will develop a mini-work sample (min-unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection).

**SCED262. K-12 FIELD EXPERIENCE AND BUILDING STUDENT RELATIONSHIPS. 1-3 Semester Hr.**

This course is designed to provide Mines students with opportunities to participate in, analyze, and reflect on issues in a science K-12 school classroom setting. The overall goal is for Mines students to understand who their students are, build relationships, and begin exploring learner development and learner differences. Specifically, the course will focus on developing Mines students ability to identify and practice basic classroom management, differentiate instruction, ask probing questions, science content preconceptions, language/activities that promote a growth mindset, and professional language. Furthermore, Mines students will begin exploring the factors that shape school norms and culture. In addition to an on-campus seminar, there is a 25-hour field experience requirement in the students assigned partner school.

**SCED333. EDUCATIONAL PSYCHOLOGY AND ASSESSMENT. 3.0 Semester Hrs.**

An explosive growth in research on how people learn has revealed many ways to improve teaching and catalyze learning at all ages. 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 practice, such as arousal theory. Together the theories, evidence, and strategies can be combined endlessly to create original and effective learning plans and the means to know if they succeed.

**SCED363. DYNAMIC TEACHING: MOTIVATION, CLASSROOM MANAGEMENT, AND DIFFERENTIATION OF INSTRUCTION. 3.0 Semester Hrs.**

Effective teaching is a dynamic process that requires the instructor to motivate, manage, and vary instruction for all learners in the classroom. 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. This course will cover the field-defining theories of motivation, classroom management, and differentiation. Additionally, this course will introduce research-based practices that can be used to create learning environments where students are motivated and given the tools to be successful in their individual learning.

**SCED398. SPECIAL TOPICS. 6.0 Semester Hrs.**

Pilot course or special topics course. Topics chosen from special interests of instructor(s) and student(s). Usually the course is offered only once, but no more than twice for the same course content. Variable credit: 0 to 6 credit hours. Repeatable for credit under different titles.

**SCED415. SCIENTIFIC PRACTICES VS ENGINEERING DESIGN AND THE NATURE OF SCIENCE. 3.0 Semester Hrs.**

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 communicating information. These skills will be modeled, practiced and mastered in the context of science, specifically: 1) earthquakes and waves, 2) mitosis, meiosis, and reproduction, 4) periodic table of the elements, 5) energy conservation, and 6) forces in static equilibrium. In addition this course will prepare students to be able to communicate effectively in a variety of mediums (written, oral, and digital) as educators about scientific and engineering practices.

**SCED445. PHYSICS AND CHEMISTRY TEACHING TECHNIQUES. 3.0 Semester Hrs.**

In this course students will engage as learners of physics and chemistry through evidence-based teaching strategies. After each unit of instruction, students will reflect on the practices used during the unit and why these practices are effective techniques for teaching science. The goal of this course is for teacher candidates to develop an awareness of 1) the common misconceptions and learning progressions associated with physics and chemistry; 2) evidence-based teaching strategies for physics and chemistry; and 3) the importance of and techniques for placing all content within a context that is familiar to and interesting to your specific student body. Students will leave this course with a minimum of a full month of curriculum annotated and ready to deliver to middle or high school physical science and high school physics courses.

**SCED464. CAPSTONE CURRICULUM DESIGN I. 3.0 Semester Hrs.**

This course provides Mines students an intensive 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 learners, classroom management and organization, content knowledge, and professionalism. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is a 100-hour field experience requirement in the students assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction as well as participate in other school related professional roles and will develop a mini-work sample (min-unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection). Prerequisite: SCED262, SCED333, SCED363, SCED415, SCED445 with a grade of C or higher.

**SCED465. CAPSTONE CURRICULUM DESIGN II. 6-12 Semester Hr.**

This course provides Mines students an immersive student 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 learners, classroom management and organization, content knowledge, and professionalism. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is a 32-hour per credit hour enrolled field experience requirement in the students assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction for each 3 credit hours enrolled as well as participate in other school related professional roles and will develop a work sample (unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection). Prerequisite: SCED464 with a grade of C or higher.

**SCED515. SCIENTIFIC PRACTICES VS ENGINEERING DESIGN AND THE NATURE OF SCIENTIFIC KNOWLEDGE. 3.0 Semester Hrs.**

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 communicating information. These skills will be modeled, practiced and mastered in the context of science, specifically: 1) earthquakes and waves, 2) mitosis, meiosis, and reproduction, 4) periodic table of the elements, 5) energy conservation, and 6) forces in static equilibrium. In addition this course will prepare students to be able to communicate effectively in a variety of mediums (written, oral, and digital) as educators about scientific and engineering practices.

**SCED533. EDUCATIONAL PSYCHOLOGY AND ASSESSMENT. 3.0 Semester Hrs.**

An explosive growth in research on how people learn has revealed many ways to improve teaching and catalyze learning at all ages. 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 practice, such as arousal theory. Together the theories, evidence, and strategies can be combined endlessly to create original and effective learning plans and the means to know if they succeed.

**SCED545. PHYSICS AND CHEMISTRY TEACHING TECHNIQUES. 3.0 Semester Hrs.**

In this course students will engage as learners of physics and chemistry through evidence-based teaching strategies. After each unit of instruction, students will reflect on the practices used during the unit and why these practices are effective techniques for teaching science. The goal of this course is for teacher candidates to develop an awareness of 1) the common misconceptions and learning progressions associated with physics and chemistry; 2) evidence-based teaching strategies for physics and chemistry; and 3) the importance of and techniques for placing all content within a context that is familiar to and interesting to your specific student body. Students will leave this course with a minimum of a full month of curriculum annotated and ready to deliver to middle or high school physical science and high school physics courses.

**SCED562. K-12 FIELD EXPERIENCE AND BUILDING STUDENT RELATIONSHIPS. 1-3 Semester Hr.**

This course is designed to provide Mines students with opportunities to participate in, analyze, and reflect on issues in a science K-12 school classroom setting. The overall goal is for Mines students to understand who their students are, build relationships, and begin exploring learner development and learner differences. Specifically, the course will focus on developing Mines students' ability to identify and practice basic classroom management, differentiate instruction, ask probing questions, science content preconceptions, language/activities that promote a growth mindset, and professional language. Furthermore, Mines students will begin exploring the factors that shape school norms and culture. In addition to an on-campus seminar, there is a 25-hour field experience requirement in the student's assigned partner school.

**SCED563. DYNAMIC TEACHING: MOTIVATION, CLASSROOM MANAGEMENT, AND DIFFERENTIATION OF INSTRUCTION. 3.0 Semester Hrs.**

Effective teaching is a dynamic process that requires the instructor to motivate, manage, and vary instruction for all learners in the classroom. 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. This course will cover the field-defining theories of motivation, classroom management, and differentiation. Additionally, this course will introduce research-based practices that can be used to create learning environments where students are motivated and given the tools to be successful in their individual learning.



**SCED564. CAPSTONE CURRICULUM DESIGN I. 3.0 Semester Hrs.**

This course provides Mines students an intensive 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 learners, classroom management and organization, content knowledge, and professionalism. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is an approximately 6 hours per week (100-hours total) field experience requirement in the student's assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction as well as participate in other school related professional roles and will develop a mini-work sample (min-unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection).

**SCED565. CAPSTONE CURRICULUM DESIGN II. 6-12 Semester Hr.**

This course provides Mines students an immersive student 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 learners, classroom management and organization, content knowledge, and professionalism. In addition to a total of 15 hours of seminars (on campus and teacher professional development), there is a 32-hour per credit hour enrolled field experience requirement in the student's assigned partner school. During this semester, the student will be responsible for planning and teaching at least five periods of classroom instruction for each 3 credit hours enrolled as well as participate in other school related professional roles and will develop a work sample (unit of instruction including: description of setting, learning objectives, three class periods or more of standards-based lesson plans, pre/post assessment, and reflection).

**Executive Director**

Toni Lefton, Executive Director, University Honors & Scholars Programs and Assistant Provost for Signature Student Experience

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Harry Archer

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