

**Faculty Senate Minutes**  
**11/20/2020**  
**1:00pm-2:00pm**  
**Kelly Steward and Virtual Meeting via Zoom**

**In Person:** Charie Faught (Chair), Peter Lucon (Vice-Chair), Ron White, Linda Granger, Ulana Holtz, Atish Mitra (Secretary)

**Zoom:** Ryan Stapley, Karen Wesenberg, Rita Freebourn, John Ray, Miriam Young, Matthew Haynes, Tamara Harp, Tony Patrick, Bret Robertson, Phil Curtiss, Matt Donnelly, Katherine Zodrow, Glenn Shaw, Courtney Young, Dan Autenrieth, Jackie Timmer, Richard LaDouceur.

**Quorum@ 1:00 pm**

- I. Welcome and Minutes (<https://www.mtech.edu/facultystaff/facultysenate/minutes/index.html>)

Approvals for October 23, 2020 Meeting Minutes

Motion to approve, and seconded. **PASSED.**

**Action Items**

- II. CRC Items
- a. Automotive Technology
  - b. Business IT pre-req's
  - c. Construction Technology
  - d. Computer Science/Software Engineering
  - e. Geological Engineering (three CRC forms)

Motion to approve all CRC items above, and seconded. **PASSED.**

- III. Level II BOR- Camp Name Change

Ron White presented.

Motion to approve, and seconded. **PASSED.**

- IV. Recommendation for Research Vice Chancellor and Professor Emeritus (see below)

Glenn Shaw presented on behalf of Geological Engineering (recommendation for both research vice-chancellor and professor emeritus status).

Motion to move the recommendation forward (to Provost and Chancellor), and seconded. **PASSED.**

## V. All Faculty Meeting

Chair reported: Proposal to change language in FS handbook approved. Minutes available on senate website. We plan to have another all faculty meeting next semester (Spring 2021).

## VI. Activities and priorities for the upcoming year

## a. Faculty and Staff Recognition

Chair: Faculty and Staff have gone above and beyond call of duty this semester, for which the senate commends them. Larry Smith's emeritus status moving forward after senate approval. Courtney Young named the 2020 recipient of Antoine M Gaudin Award.

## b. Strategic Planning

Chair: Chancellor has sent out a list of names of the committee members. Both the senate Chair and Vice Chair are members of the committee. At least two meets are planned during the upcoming Christmas break.

## c. Spring semester planning

Chair: As per current plans, the spring 2021 semester will be very similarly organized to fall 2020. There will be no spring break, and semester is planned to end on 24<sup>th</sup> April. The Provost recommends that we plan to place course material online, to be prepared for both student and faculty absences.

## d. Review of FS Standards as Compared to MTFA Standards for Instruction, Research and Scholarly Activity, and Service

Chair: Suggest we form a subcommittee to look at FS handbook standards and compare to MTFA, and (potentially) make recommendations for possible changes. Discussion by senators: Suggest that we choose 1 or 2 faculty from each school for this subcommittee. Further discussions during next meeting.

## VII. Scheduling for Spring Semester

Chair: Will send out a Doodle poll as usual, with tentative plans to start meetings from the second or third week of classes.

## VIII. Other Items

Chair: We have an official scheduled meeting two weeks from now. We will plan on meeting only in case some important topics need discussion by then.

**Motion to adjourn @ 1:40pm.**

THAT:

Upon the occasion of the retirement of Dr. Beverly Karplus Hartline from Montana Technological University, the faculty wishes to express its appreciation for her many years of dedicated and valued service to the institution, the Graduate School, the College of Letters, Sciences, and Professional Studies, the School of Mines and Engineering, and Highlands College, and the state of Montana by recommending the rank of Research Vice Chancellor & Professor Emeritus be conferred upon her by the Board of Regents of the Montana University System.

EXPLANATION:

Dr. Beverly Karplus Hartline received her B.A. degree in chemistry and physics from Reed College in 1971 and her Ph.D. from the University of Washington in 1978. Her dissertation was on hydrothermal circulation in the ocean crust, prior to and anticipating the discovery of biologically rich seafloor hot springs. Prior to completing her Ph.D., Dr. Hartline spent one year as a visiting assistant professor of natural science at Hampshire College in Amherst, MA. After graduate school, Dr. Hartline spent two years with the American Association for the Advancement of Science in Washington DC as a writer for the Research News Section of the journal, *Science*. She then spent two-and-a-half years at the National Aeronautics and Space Administration's Goddard Space Flight Center doing research to develop remote sensing capabilities for hydrologic sciences—especially for monitoring snowpacks and measuring their water equivalent. She next moved to the Lawrence Berkeley Laboratory and contributed to strategic planning and the development and fundraising for the Center for Advanced Materials and the Advanced Light Source—a world leading synchrotron radiation source providing intense beams of light—mostly in the Vacuum Ultraviolet University spectral band for studying materials and chemical reactions. She was then recruited to the team that finalized the design and secured funding to build the \$0.5 billion world-class scientific user facility now operating in southeast Virginia as Jefferson Lab in the national-laboratory system of the U.S. Department of Energy. She was responsible for completing the project within cost, on schedule and assuring it achieved its scientific performance goals. She also initiated and led innovative outreach programs to engage local inner-city K-12 students and their teachers in hands-on science and engineering activities. When the project was completed and the facility was operating for research by users throughout the United States and around the world, Dr. Hartline moved back to Washington DC, to serve as Assistant Director for Physical Science and Engineering at the White House Office of Science and Technology Policy. Her career then led to scientific management roles at Los Alamos National Laboratory. She left New Mexico to become Deputy Laboratory Director at Argonne National Laboratory in Illinois. Dr. Hartline moved from there sequentially to Heritage University in Central Washington, Delaware State University in Dover, and the University of the District of Columbia, all minority-serving universities, where she contributed to student success, enrollment growth in the graduate school, and research expansion. For eleven years, she was a member the 12-person international Working Group on Women in Physics, helping to organize four international conferences on women in physics and serving as the editor for three of the conference proceedings volumes. She has been recognized nationally as a Fellow of the American Association for the Advancement of Science, the American Physical Society, and the Association for Women in Science, is frequently invited to review proposals for funding agencies, and has served on many professional society leadership groups and government advisory committees.

Since arriving at Montana Tech as Vice Chancellor for Research and Dean of the Graduate School with non-tenurable rank of Professor, Dr. Hartline has applied her skills, knowledge, and the networks gained in her previous roles to help grow Montana Tech's national visibility and reputation, as well as its research funding and graduate programs. Dr. Hartline's contributions at Montana Tech have focused on supporting faculty--so that they can expand graduate enrollment in their departments, increase research activity in collaboration with students, foster student success and completion, and grow external grant funding.

In particular, some highlights of her accomplishments include increasing overall graduate enrollment by 44% since 2011; increasing the number of grants submitted by 50% (relative to 2013 numbers) while doubling the amount of grant funds requested and tripling the amount of grant funds received; launching Montana Tech's first two doctoral programs; and working with Tech's Center for Advanced Mineral Processing and the Army Research Lab to develop a cooperative research relationship that has brought in ~\$20 million since 2015 for materials and advanced manufacturing research, supporting over a dozen faculty, at least 30 graduate students, and many undergraduate researchers in half a dozen departments. She worked tirelessly to develop, improve and present many professional-development workshops for Faculty, Staff, and Students: Principal Investigators (PI), writing winning proposals, Responsible Conduct of Research (RCR), grant management, weekend thesis/dissertation workshop for grad students, annual NSF National Graduate Research Fellowship workshop for seniors and grad students. She also assisted many students and faculty one-on-one with strengthening the competitiveness of proposals and finding funding sources. She has significantly raised Montana Tech's international visibility and reputation by presenting invited talks about collaborating with Montana Tech at four universities in China, one university in Guinea, two universities in Cameroon, two universities in Nigeria, and one university in India, and helped establish new international agreements with these campuses. She has built a strong set of programs and infrastructure that will propel Montana Tech into the new millennium and leaves a lasting legacy that will serve the campus community far into the future.

Dr. Hartline's tenure at Montana Tech can be characterized by exceptional contribution to faculty research, research infrastructure, graduate programs, undergraduate research, student success, and overall service to the University and to the State for which she is to be commended. For these and numerous other contributions, the Department of Geological Engineering is pleased to nominate Dr. Beverly Karplus Hartline for the rank of Research Vice Chancellor & Professor Emeritus at Montana Technological University.

**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

### **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

1. **Faculty Approvals (directly to CRC, then Faculty Senate):**

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information) Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite

X Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required Documents:

- Documents as listed under establishing a new course (as applicable)**
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

Other (for those that are considered in this level but otherwise not listed):

---

2. **Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):**

Placing a postsecondary educational program into moratorium: Required Documents:

- Program Termination and Moratorium Form**
- Academic Proposal Request Form

Withdrawing a postsecondary educational program from moratorium. Required Documents:

- Academic Proposal Request Form

- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form
- Other (for those that are considered in this level but otherwise not listed):

---

  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (*must be approved by the VCAA and Chancellor prior to CRC submission*): Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Other (for those that are considered in this level but otherwise not listed):

- 
- Academic Proposal Request Form

4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Curriculum Proposal
  - Completed Intent to Plan Form

**Date** October 27, 2020

**Dept.** Trades and Technical

**Program:** Automotive Technology

**College:** Highlands College

**CRC Representative:** Tony Patrick

**Description of Request:** Remove two remedial and non-transferable courses from the curriculum and add the appropriate replacements.

**Current Course or Program Information:** Automotive Technology AAS degree changes

**Number (Assigned By CRC):** \_\_\_\_\_

**Proposed Change**

<b>Course #</b>	<b>Name</b>	<b>Credits</b>	<b>Pre-req.</b>
<b>Delete the following courses:</b>			
M111	Technical Math	3	
WRIT 100	Composing Mindfully: Writing Fundamentals	3	
COMX 115	Interpersonal Communication	3	
<b>Add the following courses:</b>			
M105	Contemporary Math	3	
WRIT 101 or 121	College Writing or Intro. to Technical Math	3	<b>Change Tech Math to Tech Writing</b>
PSYX 100	Introduction to Psychology	3	



**List of supporting documentation attached (See Level of Request for Requirements):**

Not Applicable.

**Assessment Leading to Request**

In order to have transferable courses, these changes are required.

**Anticipated Impacts to “Other” Programs**

None.

**Impact on Library:** No consultation is required since changes are only in the course number, course name, or course pre-requisites.

**Date to take effect:** Spring of 2021.

## APPROVALS

Department Head Approval

Anton Patrick

Date: October 27, 2020

Dean Approval

Date 10-26-20

*Aaron Vandanceer*

Graduate Council Approval

Date \_\_\_\_\_

CRC Approval

Date 11/11/2020

*A. Stutz*

Faculty Senate Approval

Date \_\_\_\_\_

VCAA Approval (see below)

Date \_\_\_\_\_

Chancellor Approval (see below)

Date \_\_\_\_\_

## Old Curriculum Sheet

### 1st Semester

---

- AST 118 - Brakes & Chassis 3 credits
- AST 119 - Brakes & Chassis Lab 4 credits
- AST 160 - Automotive Engine Repair (Lec) 3 credits
- AST 161 - Automotive Engine Repair (Lab) 4 credits
- AST 102 - Introduction To Automotive Service 3 credits

**Total: 17**

---

### 2nd Semester

---

- AST 136 - Automotive Electrical/Electronics Systems 3 credits
- AST 137 - Automotive Electrical/Electronics Systems Lab 4 credits
- AST 166 - Engine Performance & Diagnostics 2 credits
- AST 167 - Engine Performance & Diagnostics Lab 4 credits
- M 111 - Technical Mathematics 3 credits
- AST 126 - Parts Sourcing 3 credits

**Total: 19**

---

### 3rd Semester

---

- COMX 115 - Interpersonal Communication 3 credits
- DST 260 - Diesel Engine Diagnostic Troubleshooting 3 credits
- DST 265 - Applied Lab Experience 4 credits
- AST 270 - Automatic Transmissions and Transaxles 3 credits
- AST 271 - Automatic Transmissions and Transaxles Lab 4 credits

**Total: 17**

---

### 4th Semester

---

- AST 230 - Electrical/Electronics Sys II (Lec) 3 credits
- AST 231 - Electrical/Electronics Sys II (Lab) 4 credits
- AST 172 - Automotive Air Conditioning (Lab) 4 credits
- CAPP 131 - Basic MS Office 3 credits
- WRIT 100 - Composing Mindfully: Writing Fundamentals 3 credits

**Total: 17**

## NEW CURRICULUM SHEET

### Automotive Technology AAS Curriculum Sheet

Course Number	Title	Credits	Semester Completed
<b>FIRST SEMESTER</b>			
AST 118	Brakes & Chassis	3	
AST 119	Brakes & Chassis Lab	4	
AST 160	Automotive Engine Repair (Lecture)	3	
AST 161	Automotive Engine Repair (Lab)	4	
AST 102	Introduction to Automotive Service	3	
Total Credits		<b>17</b>	
<b>SECOND SEMESTER</b>			
AST 136	Automotive Electrical/Electronics Systems	3	
AST 137	Automotive Electrical/Electronics Systems Lab	4	
AST 166	Engine Performance & Diagnostics	2	
AST 167	Engine Performance & Diagnostics Lab	4	
M 105	Contemporary Math	3	
AST 126	Parts Sourcing	3	
Total Credits		<b>19</b>	
<b>THIRD SEMESTER</b>			
PSYX 100	Introduction to Psychology	3	
DST 260	Diesel Engine Diagnostic Troubleshooting	3	
DST 265	Applied Lab Experience	4	
AST 270	Automatic Transmissions & Transaxles	3	
AST 271	Automatic Transmissions & Transaxles Lab	4	
Total Credits		<b>17</b>	
<b>FOURTH SEMESTER</b>			
AST 230	Electrical/Electronics Systems II (Lecture)	3	
AST 231	Electrical/Electronics Systems II (Lab)	4	
AST 172	Automotive Air Conditioning (Lab)	4	
CAPP 131	Basic MS Office	3	
WRIT 101 or WRIT 121	College Writing or Intro. to Technical Writing	3	
Total Credits		<b>17</b>	

**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

## **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

### 1. *Faculty Approvals (directly to CRC, then Faculty Senate):*

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information) Required

Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite

- Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required

Documents:

- Documents as listed under establishing a new course (as applicable)**
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Other (for those that are considered in this level but otherwise not listed):
- 

### 2. *Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):*

- Placing a postsecondary educational program into moratorium: Required Documents:

- Program Termination and Moratorium Form**
- Academic Proposal Request Form

- Withdrawing a postsecondary educational program from moratorium. Required Documents:

- Academic Proposal Request Form

- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (*must be approved by the VCAA and Chancellor prior to CRC submission*):  
Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**

4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program

- Request to Plan (RTP)
- Academic Proposal Request Form
- Curriculum Proposal
- Fiscal Analysis Form
- Completed Intent to Plan Form
- Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - C.A.S/A.A.S Curriculum Proposal
  - Fiscal Analysis Form
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
- Curriculum Proposal
- Completed Intent to Plan Form

Date October 28, 2020

Dept. Business

Program all options under the BS program

College CLSPS

CRC Representative Kober

Description of Request: \_\_\_\_\_

BMIS 375 currently lists STAT 216 or STAT 332 as pre-requisites. This proposal would change these to co-requisites and add STAT 131 as a co-requisite.

Current Course or Program Information: \_\_\_\_\_

Pre-requisite: STAT 216 or STAT 332

Number (Assigned By CRC): \_\_\_\_\_

Proposed Change

Course #	Name	Credits	Pre-req.
BMIS 375	Data Analytics	3 Cr	Co-req. STAT 131 or STAT 216 or STAT 332

**This should include what will appear in the catalog, exactly.** New course require course outcomes listed in this area.

List of supporting documentation attached (See Level of Request for Requirements):



**Assessment Leading to Request**

**Anticipated Impacts to “Other” Programs**

**Impact on Library:** \_\_\_\_\_ has consulted with \_\_\_\_\_ at the Montana Tech library to ensure needed materials and media are available. (Or No consultation is required since changes are only in the course number, course name, or course pre-requisites.)

**Date to take effect (note that the earliest date is the next calendar year):** \_\_\_\_\_

**APPROVALS**

**Department Head Approval**

Date 10/28/2020

Tim

Digitally signed by Tim  
DN: cn=Tim, o, ou=Department of Business, email=tkober@mttech.edu, c=US  
Date: 2020.10.28 13:59:12 -06'00'

**Dean Approval**

Date 10/28/2020



**Graduate Council Approval**

Date \_\_\_\_\_

**CRC Approval**

Date 11/11/2020



**Faculty Senate Approval**

Date \_\_\_\_\_

**VCAA Approval (see below)**

Date \_\_\_\_\_

**Chancellor Approval (see below)**

Date \_\_\_\_\_

## Advising Sheet for Geological Engineering

Geological Engineering  
2019/2020

Student Name \_\_\_\_\_

Course Number	Course Title	Date Completed	Math & Science	Eng. Topics	Engineering Design	HSS	Comm & Other	Semester Total
CHMY 141	College Chemistry I		3					Freshman
CHMY 142	College Chemistry Lab I		1					
EGEN 101	Intro to Eng Calc & Problem Solv			3	X			
EGEN 194	EGEN Seminar			1				
M 171	Calculus I		3			3		
WRIT 121	Social Science Elective						3	17
	Intro Writing - 121 preferred							
CHMY 143	College Chemistry II		3					Freshman
	Engin. Computing skillsφ		2					
GEO 101	Introduction to Physical Geology		3					
GEOE 104	Intro to Geological Engineering			1	X			
M 172	Calculus II		3					
PHSX 234	Gen Phys - Mechanics		3					18
	Humanities Elective					3		
GEO 209	Intro to Field Geology		1					Sophomore
EGEN 201	Statics			3				
GEO 257	Sedimentology & Pet Geology		3					
GEO 259	Sed Strat Lab		1					
M 273	Multivariable Calculus		4					
MIN 152	Mapping, Surf Mod & Volumetrics			2	X			17
PHSX 235	Gen Phys - Heat, Sound & Optics		3					
ECNS 203	Prin of Micro and Macro (preferred)^					3		15
EGEN 305	Mechanics of Materials			3				
GEO 204	Intro to Mineralogy-Petrology W/Lab		3					
M 274	Introduction to Differential Equations		3					
PHSX 237	Gen Phys - Elec,Magn & Motion		3					
EGEN 325	Engineering Economic Analysis			3				Junior
GEOE 420	Hydrogeology for Engineers			3	X			
GEOE 440	Engineering Geology			3	X			
GEOE 302	Elements of Geophysics			3				
MIN 210	Plane Surveying			3				
STAT 332	Statistics for Scientists & Engineers		3					18
EGEN 335	Fluid Mechanics			3				Junior
GEOE 403	Structural Geology for Engineers			3	X			
MIN 467	Geomechanics			3	X			
WRIT 321	Advanced Technical Writing						3	
	F.E. Elective*			3				
	GEOE/ Tech Elective			3				18
GEOE 405	Field Geology & Geophysics		2	4	X			6
	F. E. Elective*			3				Senior
	F. E. Elective*			3	X			
	GEOE & Tech Elect. 3			3				
GEOE 410	Mining Geology			3	( )			
	Humanities Elective					3		
								15
GEOE 495	GEOE Engineering Design Project			3	X			Senior
	Taken FE Exam			0				
	GEOE & Tech Elect. 3			3	( )			
	GEOE & Tech Elect. 3			3	( )			
	GEOE & Tech Elect. 3			3	( )			
								12
Total			47	71		12	6	136
Total credits for graduation:					136			

φ - Select one: GPHY 284 - Intro to GIS; MIN 105 - Intro to Mining; EENV 106 - Enviromental Software; ECIV 215 - Introduction to Modeling for Civil Engineers; CSCI 111, CSCI 112, or CSCI 117 - introductory programming (with lab)

^ ECNS 203 is preferred; ECNS 201 or ECNS 202 are accepted

\* Select 3 fundamentals of engineering electives from EGEN 202 - Dynamics, EELE 201 - Electrical Circuits, EGEN 324 - Thermodynamics (or PET 372- Petroleum Fluids & Thermodynamics), EGEN 213 Survey of Metallurgical & Materials Engineering, and M 333 - Linear Algebra.

updated 2/12/2019

## NEW Advising Sheet for Geological Engineering

Geological Engineering  
2020/2021

Student Name \_\_\_\_\_

Course Number	Course Title	Date Completed	Math & Science	Eng. Topics	Engineering Design	HSS	Comm & Other	Semester Total	Summary of Changes	
CHMY 141	College Chemistry I		3					Freshman-1		
CHMY 142	College Chemistry Lab I		1							
EGEN 101	Intro to Eng Calc & Problem Solv			3	X					
EGEN 194	EGEN Seminar			1						
M 171	Calculus I		3							
	Social Science Elective					3				
WRIT 121/101	Intro Writing - 121 preferred						3	17		
CHMY 143	College Chemistry II		3					Freshman-2		
GPHY 284	Intro to GIS Cartography		3						Increase credits from 2 to 3	
GEO 101	Introduction to Physical Geology		3							
GEOE 104	Intro to Geological Engineering			1	X					
M 172	Calculus II		3							
PHSX 234	Gen Phys - Mechanics		3					16	Move Humanities to spring senior sem.	
GEO 209	Intro to Field Geology		1					Sophmore-1		
EGEN 201	Statics			3						
GEO 257	Sedimentology & Pet Geology		3							
GEO 259	Sed Strat Lab								Delete	
M 273	Multivariable Calculus		4							
MIN 210	Plane Surveying			3					Move from fall junior semester	
PHSX 235	Gen Phys - Heat, Sound & Optics		3					17		
ECNS 203^	Prin of Micro and Macro (preferred)^					3		Sophmore-2		
EGEN 305	Mechanics of Materials			3						
GEO 204	Intro to Mineralogy-Petrology W/Lab		3							
M 274	Introduction to Differential Equations		3							
STAT 332	Statistics for Scientists & Engineers		3						Move from fall junior semester	
PHSX 237	Gen Phys - Elec, Magn & Motion		3					18		
EGEN 325	Engineering Economic Analysis			3				Junior-1		
GEOE 420	Hydrogeology for Engineers			3	X					
GEOE 440	Geological Engineering			3	X				Change Name	
GEOE 302	Elements of Geophysics			3						
ECIV 486	Soil Mechanics and Foundation design			3	X				Add required class	
ECIV 487	Soil Mechanics & foundation lab			1	X			16	Add required class	
EGEN 335	Fluid Mechanics			3				Junior-2		
GEOE 403	Structural Geology for Engineers			3	X					
MIN 467	Geomechanics			3	X					
WRIT 321	Advanced Technical Writing						3			
	F. E. Elective*			3						
	GEOE/ Tech Elective			3				18		
Field Camp	Field Geology (GEO 429)		2						Replace GEOE409 with modules	
	Field Hydro or Geotech (GEOE 429 or 449)			2	X			4		
GEOE 499W	GEOE Engineering Design Project			3	X			Senior-1		
	F. E. Elective*			3						
	GEOE & Tech Elect. 3			3	( )					
	Humanities Elective					3				
GEOE 410	Mining Geology		2	1				15		
	F. E. Elective*			3				Senior-2		
	Taken FE Exam			0						
	GEOE & Tech Elect. 3			3	( )					
	GEOE & Tech Elect. 3			3	( )					
	GEOE & Tech Elect. 3			3	( )					
	Humanities Elective					3		15	Moved from semester 2	
Total			49	69	136	12	6	136		
Total credits for graduation:									136	

^ ECNS 203 is preferred; ECNS 201 or ECNS 202 are accepted

\* Select 3 fundamentals of engineering electives from EGEN 202 - Dynamics, EELE 201 - Electrical Circuits, EGEN 324 - Thermodynamics (or PET 372- Petroleum Fluids & Thermodynamics), EGEN 213 Survey of Metallurgical & Materials Engineering, M 333 - Linear Algebra, and one introductory programming class - CSCI 110, 111, 112, 113, 116, 117, or 135. Added choice of one CSCI class

**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

### **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

1. **Faculty Approvals (directly to CRC, then Faculty Senate):**

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information) Required

Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite

- ✓ Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required

Documents:

- Documents as listed under establishing a new course (as applicable)**
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Other (for those that are considered in this level but otherwise not listed):
- 

2. **Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):**

- Placing a postsecondary educational program into moratorium: Required Documents:

- Program Termination and Moratorium Form**
- Academic Proposal Request Form

- Withdrawing a postsecondary educational program from moratorium. Required Documents:

GeoE 440 Name change (from "Engineering Geology" to "Geological Engineering")

- Academic Proposal Request Form
- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form
- Other (for those that are considered in this level but otherwise not listed):

---

  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (must be approved by the VCAA and Chancellor prior to CRC submission):  
Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Other (for those that are considered in this level but otherwise not listed):

---

- Academic Proposal Request Form

4. Level II (must be approved by the VCAA and Chancellor prior to CRC submission):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Curriculum Proposal
  - Completed Intent to Plan Form

GeoE 440 Name change (from "Engineering Geology" to "Geological Engineering")

Date 9/23/20

Dept. Geological Engineering College School of Mines & Engineering

Program BS/MS/MEng CRC Representative L. Smith

Description of Request: Course Name Change

Change the name of GeoE 440 Engineering Geology, to GeoE 440 Geological Engineering

Current Course or Program Information: GeoE 440 Engineering Geology

This is a required course in the Geological Engineering bachelor's program, and required or recommended in the MS and MEng programs housed within the department.

Number (Assigned By CRC): \_\_\_\_\_

**Proposed Change**

Course #	Name	Credits	Pre-req.
GeoE 440	Geological Engineering	3	Geo 101, EGEN 201
<b>Current catalog description:</b> A study of the application of geology to engineering practice covering the characterization and engineering behavior of soil and rock, geologic site investigation, geologic hazards, and the influence of geology on various types of construction projects (particularly excavations, dams, and foundations).			
<b>Adjusted description to read:</b> Course covers the basic topics involved in the field of geological engineering: the characterization and engineering behavior of soil and rock, geologic site investigation, geologic hazards, and the influence of geology on various types of construction projects (particularly excavations, dams, and foundations).			
<b>This should include what will appear in the catalog, exactly. New course require course outcomes listed in this area.</b>			

**List of supporting documentation attached (See Level of Request for Requirements:**

Syllabus (lists course outcomes), Current and Adjusted Curriculum Sheets (see separate CRC item)

**Assessment Leading to Request**

Prior to 1996, this course had been taught for many years by a faculty member with a background in geology and is now generally taught by a geological engineer. The content is not significantly different but has been adjusted to focus more on "engineering" rather than "geology." In the past, many textbooks were available with the title "Engineering Geology," but there is now an excellent textbook with the title "Geological Engineering" that covers the course content very well. Lastly, it is always good to have a course within the curriculum that has a title that matches the program's degree title.

**Anticipated Impacts to "Other" Programs**

Minimal, as this course is not required by any other BS program. Slight adjustments to curricula for several master's programs within the department, currently under development, will be easily incorporated.

**Impact on Library:** No consultation is required since changes are only in the course number, course name, or course pre-requisites.

**Date to take effect:** 1/1/2021



# MontanaTech

Curriculum Change Request Form Dated August 15, 2020

GeoE 440 Name change (from "Engineering Geology" to "Geological Engineering")

## APPROVALS

Department Head Approval

Date 10/14/20



---

Dean Approval

Date 10/20/20

*Dan Trudnowski*

---

Graduate Council Approval

Date \_\_\_\_\_

---

CRC Approval

Date 10/27/2020

*A. Hout*

---

Faculty Senate Approval

Date \_\_\_\_\_

---

VCAA Approval (see below)

Date \_\_\_\_\_

---

Chancellor Approval (see below)

Date \_\_\_\_\_

---

**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

## **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

### 1. *Faculty Approvals (directly to CRC, then Faculty Senate):*

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information) Required Documents:

Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite
- Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:
  - Course Number
  - Course Outcomes
  - Course Description
  - Syllabus
  - Pre-requisites or co-requisites
  - Existing Curriculum Worksheet
  - New Curriculum Worksheet, with changes highlighted
- Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required Documents:
  - Documents as listed under establishing a new course (as applicable)**
  - Existing Curriculum Worksheet
  - New Curriculum Worksheet, with changes highlighted
- Other (for those that are considered in this level but otherwise not listed):

### 2. *Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):*

- Placing a postsecondary educational program into moratorium: Required Documents:
  - Program Termination and Moratorium Form**
  - Academic Proposal Request Form
- Withdrawing a postsecondary educational program from moratorium. Required Documents:

B.S. Geo Eng GEOE 449

- Academic Proposal Request Form
- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form
- Other (for those that are considered in this level but otherwise not listed):
 

---

  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (*must be approved by the VCAA and Chancellor prior to CRC submission*): Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Other (for those that are considered in this level but otherwise not listed):
 

---

- Academic Proposal Request Form

4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Curriculum Proposal
  - Completed Intent to Plan Form

B.S. Geo Eng GEOE 449

Date 9/23/20

Dept. Geological Engineering

College School of Mines & Engineering

Program BS

CRC Representative L. Smith

**Description of Request:** Propose new course GeoE 449 Field Geotechnical Engineering

The Department of Geological Engineering is adjusting its field camp offerings to provide more choices to students. We have changed the previously required GeoE 409 (6 credits) to Geo 429 (1-4 credits). We already offer a specialty Hydro Field Camp (GeoE 429) and are proposing a specialty Geotechnical Field Camp.

**Current Course or Program Information:** GeoE 409 Field Geology/Geophysics recently changed to Geo 429

The Geological Engineering bachelor's degree curriculum contains 7 credits of field courses. We are planning to modularize the traditional 6-credit upper division field course GeoE 409, allowing students to select from a set of courses based on their interests and career goals. GeoE 449 would be a required course in the geotechnical option of the Geological Engineering bachelor's program, and available as an elective for other interested students.

**Number (Assigned By CRC):** \_\_\_\_\_

**Proposed Change**

Course #	Name	Credits	Pre-req.
GeoE 449	Field Geotechnical Engineering	1-4	GeoE 440, ECiv 486, or instructor consent
<b>Catalog description:</b>			
Provides 1-4 weeks of intensive experience with field methods of geotechnical engineering, focused on characterization of engineering sites underlain by soil and/or rock. The course will involve hands-on experience with site investigation techniques for soil and/or rock sites aligned with the expertise of the department faculty and availability of appropriate sites. Examples of topics covered may include geotechnical drilling and sampling, underground rock mass mapping and stability analysis, and UAV-based imagery collection, interpretation, and analysis. Field and laboratory characterization of geological materials will be integrated with the site investigations, in conjunction with one or more engineering design projects. A fee for supplies, transportation, and other logistical expenses is required.			
<b>Prerequisite(s):</b> GeoE 440, ECiv 486, or Consent of Instructor. Course generally offered during summer session, every other year or on demand.			
<b>This should include what will appear in the catalog, exactly. New course require course outcomes listed in this area.</b>			
Need list of course outcomes?			

**List of supporting documentation attached (See Level of Request for Requirements):**

Syllabus. Current and adjusted curriculum sheets.

**Assessment Leading to Request**

In the course evaluation comments, students have been requesting a stronger engineering component to the 6-credit traditional field course. They have also suggested that they would prefer to have choices in terms of the field course content, allowing them to focus on field methods relevant to their preferred career paths. The faculty of the Department of Geological Engineering are developing a plan to adjust the field camp offerings to align with both of these suggestions. This new proposed field course is a part of that plan. Industry input was solicited via the IAB and integrated into the course description.

**Anticipated Impacts to "Other" Programs**

B.S. Geo Eng GEOE 449

Minimal. Students in the master's programs housed within the geological engineering department and in other disciplines may choose to take this course as an elective.

**Impact on Library:** \_\_\_\_\_ has consulted with \_\_\_\_\_ at the Montana Tech library to ensure needed materials and media are available.

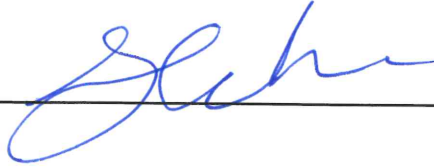
**Date to take effect:** \_1/1/2021\_\_\_\_\_

B.S. Geo Eng GEOE 449

## APPROVALS

Department Head Approval

Date 10/16/2020



---

Dean Approval

Date 10/20/20

*Dan Trudnowski*

---

Graduate Council Approval

Date \_\_\_\_\_

---

CRC Approval

Date 10/27/2020

*A. Stutz*

---

Faculty Senate Approval

Date \_\_\_\_\_

---

VCAA Approval (see below)

Date \_\_\_\_\_

---

Chancellor Approval (see below)

Date \_\_\_\_\_

---

## GeoE 449 –Field Geotechnical Engineering

**Designation:** Required (Geological Engineering, Geotechnical Option)

**Course (Catalog)  
Description:**

Provides 1-4 weeks of intensive experience with field methods of geotechnical engineering, focused on characterization of engineering sites underlain by soil and/or rock. The course will involve hands-on experience with site investigation techniques for soil and/or rock sites aligned with the expertise of the department faculty and availability of appropriate sites. Examples of topics covered may include geotechnical drilling and sampling, underground rock mass mapping and stability analysis, and UAV-based imagery collection, interpretation, and analysis. Field and laboratory characterization of geological materials will be integrated with the site investigations, in conjunction with one or more engineering design projects. A fee for supplies, transportation, and other logistical expenses is required.

**Prerequisites:** GeoE 440, or ECiv 486, or Consent of Instructor. Course generally offered during summer session, every other year or on demand.

**Textbook:** *“Geotechnical Field Manual”*, Montana Department of Transportation

**Course Objectives:** To provide students experiences with using field equipment to design geotechnical structures and solve geotechnical problems. Students, depending on availability of projects, will have a chance to observe geotechnical drilling and complete their own geotechnical site investigation report, and/or observe construction of geotechnical structures such as retaining walls and shallow/deep foundations, e.g. strip footings, mat foundations, geopier, drilled shafts, etc., and/or observe implementation of ground improvement methods. Activities include the design, performance, and interpretation of subsurface exploration methods, geotechnical structures and ground improvement methods. Students gain hands-on experience with collection of geotechnical data in the field and in the lab. Students operate in groups when performing field/lab work and produce reports as a team.

**Course Outcomes:** Graduates will be able to:

1. Use basic field/in-situ geotechnical equipment to collect engineering property data, using state-of-the-art equipment.
2. Use basic lab geotechnical equipment to collect engineering property data, using state-of-the-art equipment.
3. Design and observe different geotechnical subsurface exploration, geotechnical structures construction and ground improvement methods (depending on the projects available).



4. Gain experience working around site investigation equipment (i.e., drilling, UAVs, etc.) in a responsible and safe manner.
5. Work as a team to maximize data collection and report-writing under rigorous field/lab conditions and strict time deadlines.

**Topics Covered:** Different geotechnical drilling methods  
Standard Penetration Tests (SPT)  
Cone Penetration Tests (CPT)  
Field Vane Shear Test (FVT)  
Visual classification of soils/Rocks  
Unified Soil Classification System (USCS)  
Underground rock mass mapping  
Sample selection for laboratory testing  
Strength tests  
Consolidation and settlement  
Grain size distribution  
Plasticity, Swell potential  
Relative density  
Engineering properties from Field Measurements  
Interpretation of Engineering Properties  
How to take good field notes  
Boring log preparation  
Content and format of geotechnical reports  
Geotechnical structures: foundations and retaining structures

**Course Schedule:** Six days a week all day for one to four weeks during summer semester.  
Offered every other year, or upon demand.

**Contribution to Professional Component:**

Engineering Topics: 1-4 Credits or 100%

Engineering Design: Yes

**Relationship of Course to Geological Engineering Program Outcomes:**

- (a) An ability to apply knowledge of mathematics, science and engineering.
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data.
- (d) An ability to function on multi-disciplinary teams.
- (k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
- (o) Demonstrated ability to apply the principles of geology, elements of geophysics, geological and engineering field methods, and engineering knowledge to design solutions to geological engineering problems.

**Prepared by:** Dr. Sadeghi

**Date:** April 7, 2020

## GEOE Curriculum changes

**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

### **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

1. *Faculty Approvals (directly to CRC, then Faculty Senate):*

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information)

Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite

- X Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

X Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required Documents:

- Documents as listed under establishing a new course (as applicable)**
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Other (for those that are considered in this level but otherwise not listed):
- 

2. *Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):*

- Placing a postsecondary educational program into moratorium: Required Documents:
  - Program Termination and Moratorium Form**
  - Academic Proposal Request Form
- Withdrawing a postsecondary educational program from moratorium. Required Documents:
  - Academic Proposal Request Form

## GEOE Curriculum changes

- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form
- Other (for those that are considered in this level but otherwise not listed):

---

  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (*must be approved by the VCAA and Chancellor prior to CRC submission*): Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Other (for those that are considered in this level but otherwise not listed):

---

- Academic Proposal Request Form

## GEOE Curriculum changes

### 4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Curriculum Proposal
  - Completed Intent to Plan Form

## GEOE Curriculum changes

Date September 22, 2020

Dept. Geological Engineering

Program B.S. Geological Engineering

College SME

CRC Representative Larry Smith

**Description of Request:** Modification of curriculum and removal of GEOE 409 from catalog

1) Curriculum

With removal of a required class taught by Mining Engineering (MIN 152), changes to our field camp (below) and experience in recent years, minor modifications in our curriculum sheet and required classes became needed.

2) Remove GEOE 409 from the catalog – the course is replaced by field module classes

3) Remove GEOE 409 (6 cr) and replace with 4 cr from GEO 429 *and* GEOE 429 *or* GEOE 449 [a new class, separate CRC item]

Summary of changes:

Remove MIN 152

Require GPHY 284 Introduction to GIS Cartography (3 cr) as replacement for “Computing skills” (2 cr)

Move Humanities elective from second semester to eighth semester

Move MIN 210 from Fall Junior to Fall Sophomore semesters

Move STAT 332 from Fall Junior to Spring Sophomore semesters

Remove GEO 259 as required for the program

Require ECIV 486 and ECIV 487 Soil Mechanics and Foundation design and Soil Mechanics Lab

Replace GEOE 409 (6 cr) with 4 credits of Field Camp modules (GEO 429, GEOE 429, and GEOE 449)

Expand choices for Computer programming classes as an F.E. elective (Choose one: CSCI 110, CSCI 111, CSCI, 112, CSCI 113, CSCI 116, CSCI 117, or CSCI 135)

**Current Course or Program Information:** see attached curriculum sheets

**Number (Assigned By CRC):** \_\_\_\_\_

**Proposed Change**

Course #	Name	Credits	Pre-req.
<b>This should include what will appear in the catalog, exactly. New course require course outcomes listed in this area.</b>			

## GEOE Curriculum changes

### List of supporting documentation attached (See Level of Request for Requirements):

Previous and proposed curriculum worksheets are attached

### Assessment Leading to Request

#### General Curriculum:

- 1) These changes mostly reflect minor adjustments due to the Mining Engineering department removing MIN 152 from the catalog (with our support), and adjusting the curriculum to a new faculty in our department.
- 2) A few years ago we replaced EGEN 102 with a selection of classes, including GPHY 284, but found that most took GPHY 284 anyway and that employers require or strongly encourage our graduates to have skills in GIS. Our IAB has been encouraging our graduates to have a GIS class.
- 3) We feel that our graduates should have a basic knowledge of computer programming and that nearly any introductory computer science class will suffice. With the previous elimination of EGEN 102, which emphasized MATLAB, we want to encourage our students to take an introductory programming class as a F.E. elective.
- 4) Knowledge of soil mechanics is critical to the majority of our student's careers, and now that we have a specialist in that field on the faculty, we want all of our students to become familiar or proficient in the subject.
- 5) A 4-credit reduction in our curriculum will result from elimination of MIN 152 (2 cr) and the previously approved replacement of Field Geology and Geophysics (6 cr) with two field modules (4 cr). This reduction will be offset partly by requiring GPHY 284 (3 cr), ECIV 486 & 487 (4 cr), however this adds one credit, so...
- 6) Remove GEO 259, Sedimentology-Stratigraphy lab (1 cr) from the list of required classes. As the professor is retiring, it is unclear at this time how this course will be covered in the future. It will remain in the catalog and will be taught when possible. The faculty decided that it is more important for our students to have a soil mechanics lab (ECIV 487) than this lower-division lab. Future changes to the program may allow the department to revisit this later.

#### Remove GEOE 409 from the catalog:

- 1) We had approval in Spring 2020 to establish GEO 429 to replace GEOE 409 but the curriculum sheet showing those changes was inadvertently not brought to the CRC at that time.
- 2) Require 4 credits of field camp modules, including at least 2 credits of Field Geology GEO 429. The remaining 2 credits can be made up by either Field Hydrogeology (GEOE 429) or Field Geotechnical Engineering (GEOE 449) in place of 6 cr of Field Geology and Geophysics (GEOE 409).
  - a. GEOE 429 is an established course
  - b. GEO 429 was approved during AY 2019-20
  - c. GEOE 449 is brought separately to the CRC.

### Anticipated Impacts to "Other" Programs

Civil Engineering will experience a minor increase in enrollment in ECIV 486 & 487. This has been in effect since AY 2019-20 and has not caused problems. A few students from Computer Science, Petroleum Engineering, and Geophysics have taken GEO 259 on occasion. If that course is not taught regularly, some students will have to find other lab courses or take it when it is offered.

**Impact on Library:** Larry Smith has consulted with Scott Juskiewicz (03/24/20) at the Montana Tech library to ensure needed materials and media are available at the Montana Tech library to ensure needed materials and media are available. (Or No consultation is required since changes are only in the course number, course name, or course pre-requisites.)

GEOE Curriculum changes


Date to take effect: \_\_\_ January 1, 2021 \_\_\_\_\_

GEOE Curriculum changes

**APPROVALS**

Department Head Approval

Date 10/14/20

  
\_\_\_\_\_

Dean Approval

Date 10/20/20

Dan Trudnowski  
\_\_\_\_\_

Graduate Council Approval

Date \_\_\_\_\_

\_\_\_\_\_

CRC Approval

Date 10/27/2020

Stout  
\_\_\_\_\_

Faculty Senate Approval

Date \_\_\_\_\_

\_\_\_\_\_

VCAA Approval (see below)

Date \_\_\_\_\_

\_\_\_\_\_

Chancellor Approval (see below)

Date \_\_\_\_\_

\_\_\_\_\_



**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

## **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

### 1. *Faculty Approvals (directly to CRC, then Faculty Senate):*

- ✓ Establish a new course for the catalog (please contact the Registrar of MUS CCN information)

Required Documents:

- ✓ Course Number
- ✓ Course Outcomes
- ✓ Course Description
- ✓ Syllabus
- ✓ Curriculum Worksheet
- ✓ Pre-requisite or co-requisite

- Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- ✓ Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required Documents:

- ✓ **Documents as listed under establishing a new course (as applicable)**
- ✓ Existing Curriculum Worksheet
- ✓ New Curriculum Worksheet, with changes highlighted

- Other (for those that are considered in this level but otherwise not listed):
- 

### 2. *Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):*

- Placing a postsecondary educational program into moratorium: Required Documents:

- Program Termination and Moratorium Form**
- Academic Proposal Request Form

- Withdrawing a postsecondary educational program from moratorium. Required Documents:

- Academic Proposal Request Form

- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form
- Other (for those that are considered in this level but otherwise not listed):

---

  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (*must be approved by the VCAA and Chancellor prior to CRC submission*):  
Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Other (for those that are considered in this level but otherwise not listed):

---

  - Academic Proposal Request Form

4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination or personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Curriculum Proposal
  - Completed Intent to Plan Form

Date 10/6/2020

Dept. Computer Science

Program CS and SE

College SME

CRC Representative Michele Van Dyne

**Description of Request:** Add security course to replace maintenance in both Computer Science and Software Engineering programs.

**Current Course or Program Information:** Currently offer ESOF 326 Maintenance. Proposed course would replace that.

**Number (Assigned By CRC):** \_\_\_\_\_

**Proposed Change**

Course #	Name	Credits	Pre-req.
ESOF 376	Engineering Secure Software	3	CSCI 305 and (BMIS 375 or CSCI 340) Co-req: CSCI 361
<p>Provides students with an understanding of the theories and tools used for secure software design, threat analysis, secure coding, and vulnerability analysis. Students will study, in-depth, <i>vulnerability classes</i> to understand how to protect and secure software by applying secure software engineering principles. Students will work with various analysis and design techniques for improving software security applied to threat surfaces in the operating system, network stacks, web programming domain, database injection, malicious code, and remedies such as input validation, encryption, patch management, penetration testing, and secure coding practices. (3 cr. lecture, 2<sup>nd</sup>)</p> <p><b>This should include what will appear in the catalog, exactly. New course require course outcomes listed in this area.</b></p> <p>The student:</p> <ul style="list-style-type: none"> <li>• R1. will be to understands security issues relating to system development,</li> <li>• R2. will learn software development techniques to avoid security problems,</li> <li>• R3. will be able to explain the most common weaknesses in software security and how such problems can be mitigated in software,</li> <li>• R4. will be able to identify common security threats, risks, and attack vectors for software systems,</li> <li>• R5. will learn the best practices to defend software systems,</li> <li>• R6. will be able to recognize threats in API and writing code to prevent from them,</li> <li>• R7. will be able to design vulnerable free schemas, and learn to prepare and execute error-free queries,</li> <li>• R8. will be able to use tools to discover security problems in software,</li> <li>• R9. will master, theoretically and practically, programming techniques to develop secure, safe, reliable, and robust systems, and</li> <li>• R10. will be able to assess the security of given source code or application,</li> <li>• R11. will understand process prioritization and privilege execution of processes in modern operating systems.</li> </ul>			

**List of supporting documentation attached (See Level of Request for Requirements):**

Course Syllabus (includes course name, number, credits, description, pre-requisites, topics. Outcomes)  
Current CS Curriculum Worksheet  
Current SE Curriculum Worksheet  
Proposed CS Curriculum Worksheet  
Proposed SE Curriculum Worksheet

**Assessment Leading to Request**

Both our Industry Advisory Board and the ABET accrediting commissions for Computer Science and Software Engineering have expressed a desire that Security be covered in our programs. ABET has removed the requirement for Maintenance. In reviewing our curricula, the best way to make this change is to replace the ESOF 326 Maintenance course with CSCI 476 Computer Security.

**Anticipated Impacts to “Other” Programs**

None.

**Impact on Library:** \_\_Michele Van Dyne\_\_\_\_\_ has consulted with \_\_Scott Juskiewicz\_\_ at the Montana Tech library to ensure needed materials and media are available. (Or No consultation is required since changes are only in the course number, course name, or course pre-requisites.)

**Date to take effect:** \_\_Immediately upon Faculty Senate approval.\_\_\_\_\_

**APPROVALS**

**Department Head Approval**

Date 10/9/2020

*Michele Van Dyne*

---

**Dean Approval**

Date 10/14/2020

*Dan Trudnowski*

---

**Graduate Council Approval**

Date \_\_\_\_\_

**CRC Approval**

Date 10/26/2020

*A. Stutz*

---

**Faculty Senate Approval**

Date \_\_\_\_\_

**VCAA Approval (see below)**

Date \_\_\_\_\_

**Chancellor Approval (see below)**

Date \_\_\_\_\_

## COURSE SYLLABUS

### Course Description:

Provides students with an understanding of the theories and tools used for secure software design, threat analysis, secure coding, and vulnerability analysis. Students will study, in-depth, *vulnerability classes* to understand how to protect and secure software by applying secure software engineering principles. Students will work with various analysis and design techniques for improving software security applied to threat surfaces in the operating system, network stacks, web programming domain, database injection, malicious code, and remedies such as input validation, encryption, patch management, penetration testing, and secure coding practices. (3 cr. lecture, 2<sup>nd</sup>)

Prerequisite: BMIS 375 or CSCI 340, CSCI 305

Co-requisite: CSCI 361

### Expectations:

- E1. Knowledge of multiple modern programming languages (CSCI 135, 136, 232, 332)
- E2. Knowledge of how modern computer processors make use of registers and main memory to store and retrieve data and instructions. (CSCI 361)
- E4. Knowledge of how software applications make use of database systems for information retrieval and processing. (BMIS 375)
- E5. Knowledge of how to use application programming interfaces (APIs) to export and import functionality to/from a software library. (CSCI 332)
- E6. Ability to understand additional languages quickly. (CSCI 305).

### Outcomes:

The student:

- R1. will be to understand security issues relating to system development,
- R2. will learn software development techniques to avoid security problems,
- R3. will be able to explain the most common weaknesses in software security and how such problems can be mitigated in software,
- R4. will be able to identify common security threats, risks, and attack vectors for software systems,
- R5. will learn the best practices to defend software systems,
- R6. will be able to recognize threats in API and writing code to prevent from them,
- R7. will be able to design vulnerable free schemas, and learn to prepare and execute error-free queries,
- R8. will be able to use tools to discover security problems in software,

- R9. will master, theoretically and practically, programming techniques to develop secure, safe, reliable, and robust systems, and
- R10. will be able to assess the security of given source code or application,
- R11. will understand process prioritization and privilege execution of processes in modern operating systems.

## **Topics:**

### **Importance of security**

- What is security?

### **Practicing Secure Programming**

- Validating and sanitizing user input
- Preventing SQL injections
- Preventing cross site scripting
- Enforcing security for temporary files
- Securing REST services
- Preventing session hijacking

### **Practicing Secure Operations**

- Using Captcha
- User authentication, authorizing, and logging
- Preventing data loss
- Safe execution of remote procedure calls

### **Creating a Safe Environment**

- Securing Unix
- Securing databases
- Using encryption
- Software Vulnerabilities (memory violation, input validation, privilege escalation)
- OS vulnerabilities (patch management, rootkits and viruses)
- Penetration testing of software systems



## Bachelor of Science in COMPUTER SCIENCE

with

Name: \_\_\_\_\_

Choose One Focus Area Sophomore Year

- |   |   |
|---|---|
| <input type="checkbox"/> Business Applications      | <input type="checkbox"/> Statistical Applications |
| <input type="checkbox"/> Electronic Control Systems | <input type="checkbox"/> Technical Communications |
| <input type="checkbox"/> Engineering Applications   | <input type="checkbox"/> None                     |
| <input type="checkbox"/> Game Development           |   |

2020-2021

Fall Semester

Spring Semester

### FRESHMAN YEAR

			Credits	Sem	Grade
CSCI	135	Fund. of Computer Science I	3	_____	_____
CSCI	194	Freshman Seminar	1	_____	_____
M	171	Calculus I	3	_____	_____
WRIT	121	Intro to Technical Writing**	3	_____	_____
--	--	<i>Humanities Elective</i>	--	--	--
			3	_____	_____
--	--	<i>Social Science Elective</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>16</b>		

			Credits	Sem	Grade
CSCI	136	Fund. of Computer Science II	3	_____	_____
COMX	230	Presenting Technical Inf.**	3	_____	_____
M	172	Calculus II	3	_____	_____
CSCI	255	Intro. To Embedded Systems	3	_____	_____
--	--	<i>Science Elective*</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

### SOPHOMORE YEAR

CSCI	232	Data Struct & Algorithms	3	_____	_____
CSCI	246	Discrete Structures	3	_____	_____
M	273	Multivariable Calculus	4	_____	_____
--	--	<i>Science Elective*</i>	--	--	--
			4	_____	_____
<b>Total Credits</b>			<b>14</b>		

CSCI	332	Design and Analysis of Algor	3	_____	_____
M	274	Intro. to Differential Equations	3	_____	_____
M	333	Linear Alegbra	3	_____	_____
--	--	<i>Social Science Elective</i>	--	--	--
			3	_____	_____
--	--	<i>Science Elective*</i>	--	--	--
			4	_____	_____
<b>Total Credits</b>			<b>16</b>		

### JUNIOR YEAR

CSCI	305	Concepts of Prog. Languages	3	_____	_____
ESOF	322	Software Engineering	3	_____	_____
★STAT	332	Stats for Scientists & Engin	3	_____	_____
BMIS	375	Data Analytics	3	_____	_____
--	--	<i>Professional or Free Elective***</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

CSCI	361	Computer Architecture	3	_____	_____
ESOF	326	Software Maintenance	3	_____	_____
M	410	Numerical Computing**	3	_____	_____
CSCI	440	Advanced Database	3	_____	_____
--	--	<i>Humanities Elective</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

### SENIOR YEAR

CSCI	446	Artificial Intelligence	3	_____	_____
CSCI	466	Networks	3	_____	_____
CSCI	498	Internship**	2	_____	_____
WRIT	321W	Advanced Technical Writing**	3	_____	_____
--	--	<i>Professional or Free Elective***</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>14</b>		

CSCI	438	Theory of Computation	3	_____	_____
CSCI	460	Operating Systems	3	_____	_____
CSCI	470	Web Science	3	_____	_____
CSCI	494	Senior Seminar	1	_____	_____
CSCI	498	Internship **	2	_____	_____
--	--	<i>Professional or Free Elective**</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

*Minimum credits for B.S. degree in Computer Science = 120*

\*Science electives must include a two-semester sequence of laboratory science (min. of 11 credits total): Either (1) two of the three following sets (BIOB 101/102) or (BIOB 170) or (BIOE 305/306) plus 3 more science credits; (2) CHMY 141 w/lab 142, CHMY 143 w/lab 144 plus 3 more science credits; (3) GEO 101, GEO 257, GEO 259 plus 4 more science credits (4) PHSX 234, 235 w/lab 236, and PHSX 237 w/lab 238 (take the physics sequence for the Electronic Control Systems Option.)

\*\*WRIT 101 College Writing I can replace WRIT 121 Intro to Technical Writing. COMX 211 Adv. Public Speaking or COMX 111 Intro. to Public Speaking can replace COMX 230. CSCI 486 Senior Project can replace internship. WRIT 325W Writing in the Sciences or WRIT 322W Advanced Business Writing can replace WRIT 321W, M 426 Mathematical Modeling can replace M 410

\*\*\*Students may elect to pursue a 12-credit Computer Science degree focus area (reverse side) with free electives.

★ Students in the Statistics Option need to take STAT 332 before beginning the courses in the focus area.

# COMPUTER SCIENCE DEGREE FOCUS AREAS

Professional Electives --- Junior and Senior Years  
9 Credits for Each Focus Area

<b>Business Applications</b>					
<b>Junior Year</b>			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
ACTG 201		Principles of Financial Accounting	3		_____
ACTG 202		Principles of Managerial Accounting		3	_____
<b>Senior Year</b>					
* BMKT 325W		Principles of Marketing		3	_____
* BGEN 235		Business Law	3		_____
* BMGT 335W		Management and Organization		3	_____
* BFIN 322		Business Finance	3		_____
* <i>select 1 course out of 4</i>					
<b>Electronic Control Systems</b>					
<b>Junior Year</b>			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
* EELE 201		Circuits I for Engineering (coreq M 172)	3		_____
* EELE 202		Circuits I for Engineering Lab (coreq EELE 201)	1		_____
* EELE 261		Intro. To Logic Circuits (prereq EELE 201, 202)		3	_____
* EELE 465		Microcontroller Applications (prereq CSCI 255) (even years only)		3	_____
<b>Senior Year</b>					
* PHSX 322		Electronics for Scientists (prereq PHSX 237, 238)		3	_____
* EELE 203		Circuits II for Engineering (prereq EELE 201, 202 & M 274)	4		_____
* EELE 320		Process Instrumentation and Control (prereq EELE 201 & 202)	4		_____
* EELE 317		Electronics (prereq EELE 203)		3	_____
* GEOP 446		Applied Linear Systems (prereq M274)		3	_____
* <i>select 2 or more courses to reach a minimum of 9 elective credits within the focus area</i>					
<b>Engineering Applications</b>					
<b>Junior Year</b>			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
EGEN 101		Introduction Engineering Calculations & Problem Solving	3		_____
EGEN 201		Statics (prereq PHSX 234)		3	_____
* EMEC 215		Intro to Modeling for Mechanical Engineers (prereq M172, EGEN 101)		1	_____
<b>Senior Year</b>					
* EGEN 202		Dynamics (prereq EGEN 201 & M 172)	3		_____
* EGEN 305		Mechanics of Materials (prereq EGEN 201 & M 172)	3		_____
* EGEN 306		Mechanics of Materials Lab (co-req EGEN 305)	1		_____
* EGEN 318		Computer Applications for Engineering(prereq EMEC 215, coreq EGEN 305)		2	_____
* <i>select 1 or more courses to reach a minimum of 9 elective credits within the focus area</i>					

<b>Statistical Applications</b>					
<i>Junior Year</i>			<i>Fall</i>	<i>Spring</i>	<i>Sem/Gr</i>
	STAT 421	Probability Theory (every other year, prereq STAT 332)	3		_____
*	STAT 422	Mathematical Statistics (every other year, prereq STAT 421)		3	_____
*	STAT 441	Experimental Design (prereq STAT 332)	3		_____
*	STAT 432	Regression and Model Building (prereq STAT 332)		3	_____
<i>Senior Year</i>					
*	STAT 435	Statistical Computing & EDA (prereq STAT 332)		3	_____
*	STAT 453	Statistical Learning and Data Science I (every other year, prereq STAT 432)	3		_____
*	STAT 454	Statistical Learning and Data Science II (every other year, prereq STAT 453)		3	_____
<i>*select 2 courses out of 6</i>					
<b>Technical Communication</b>					
<i>Junior Year</i>			<i>Fall</i>	<i>Spring</i>	<i>Sem/Gr</i>
*	PTC 3156	Digital Video Productions	3		_____
	MART 310W	New Media I	3		_____
+	WRIT 321W	Advanced Technical Writing		3	_____
+	WRIT 322W	Advanced Business Writing		3	_____
*	CSCI 311	Data Driven Web Applications (prereq CSCI 135, or 110, or 114, or 112, or 117)		3	_____
<i>Senior Year</i>					
*	COMX 442	History, Technology, & Communication		3	_____
+	WRIT 325W	Writing in the Sciences	3		_____
*	WRIT 350W	Technical Editing (prereq WRIT 321W, or 322W, or 325W)		3	_____
*	PTC 4406	New Media II		3	_____
<i>+in addition to GenEd 300 level writing requirement.</i>					
<i>*select 2 courses out of 8</i>					
<b>Game Development</b>					
<i>Junior Year</i>			<i>Fall</i>	<i>Spring</i>	<i>Sem/Gr</i>
	PTC 330	Introduction to Game Design	3		_____
	MART 310W	New Media I	3		_____
	CSCI 441	Computer Graphics (prereq CSCI 332, M 333)		3	_____
<i>Senior</i>					
	PTC 4406W	New Media II		3	_____
	COMX 338	Usability Testing	3		_____
	CSCI 491	Special Topics - Computer Game Development		3	_____
	CSCI 492	Independent Study - Computer Game Development Project*	3		_____
<i>Select 9 credits from listed courses; *Project must be approved by CS faculty</i>					

## Bachelor of Science in SOFTWARE ENGINEERING

with

Name: \_\_\_\_\_

- Business Applications  
 Electronic Control Systems Option  
 Engineering Applications

- Statistical Applications  
 Technical Communications Option  
 Game Development

Choose One Focus Area Sophomore Year

### 2020 - 2021 Catalog

#### Fall Semester

#### Spring Semester

#### FRESHMAN YEAR

			Credits	Sem	Grade
CSCI	194	Freshman Seminar	1	_____	_____
CSCI	135	Fund. of Computer Science I	3	_____	_____
M	171	Calculus I	3	_____	_____
WRIT	121	Intro to Technical Writing****	3	_____	_____
CHMY	141	College Chemistry I*	3	_____	_____
CHMY	142	College Chemistry I Lab *	1	_____	_____
--	--	Humanities Elective**	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>17</b>		

			Credits	Sem	Grade
CSCI	136	Fund. of Computer Science II	3	_____	_____
COMX	230	Presenting Technical Information*	3	_____	_____
M	172	Calculus II	3	_____	_____
PHSX	234	General Physics - Mechanics	3	_____	_____
CSCI	255	Intro. To Embedded Systems	3	_____	_____
--	--	Humanities Elective**	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>18</b>		

#### SOPHOMORE YEAR

CSCI	232	Data Struct & Algorithms	3	_____	_____
CSCI	246	Discrete Structures	3	_____	_____
COMX	338	Usability Testing	3	_____	_____
M	273	Multivariable Calculus	4	_____	_____
PHSX	235	General Physics - H, S, & O	3	_____	_____
PHSX	236	General Physics-H, S, & O Lab	1	_____	_____
			17		
<b>Total Credits</b>			<b>17</b>		

CSCI	332	Design and Analysis of Algor.	3	_____	_____
ECNS	203	Principles of Micro and Macro	3	_____	_____
M	274	Intro to Differential Equations	3	_____	_____
PHSX	237	General Phys - Elect, Mag, & Wave	3	_____	_____
PHSX	238	General Phys-Elect, Mag, & Wave Lab	1	_____	_____
--	--	Social Science Elective**	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>16</b>		

#### JUNIOR YEAR

CSCI	305	Concepts of Programming Lang	3	_____	_____
BMIS	375	Data Analytics	3	_____	_____
ESOF	322	Software Engineering	3	_____	_____
★STAT	332	Statistics for Scientists & Engin	3	_____	_____
--	--	Professional Elective***	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

CSCI	361	Computer Architecture	3	_____	_____
ESOF	326	Software Maintenance	3	_____	_____
ESOF	328	Requirements & Specifications	3	_____	_____
WRIT	321W	Adv. Technical Writing****	3	_____	_____
CSCI	440	Advanced Database	3	_____	_____
			15		
<b>Total Credits</b>			<b>15</b>		

#### SENIOR YEAR

CSCI	466	Networks	3	_____	_____
EGEN	325	Engr. Economic Analysis	3	_____	_____
ESOF	427	Software Design & Architecture	3	_____	_____
ESOF	486	Senior Design Project I	2	_____	_____
--	--	Free Elective	--	--	--
			1	_____	_____
--	--	Professional Elective***	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

CSCI	460	Operating Systems	3	_____	_____
CSCI	470	Web Science	3	_____	_____
ESOF	411	Software Verification & Validation	3	_____	_____
ESOF	487	Senior Design Project II	2	_____	_____
CSCI	494	Senior Seminar	1	_____	_____
--	--	Professional Elective***	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

Minimum credits for B.S. degree in Software Engineering = 128

\* BIOB 101 (Discover Biology) and BIOB 102 (Discover Biology Lab) or GEO 101 (Intro to Physical Geology) may be substituted for CHMY 141/142.

COMX 111 Intr to Public Speaking or COMX 211 Adv Public Speaking can replace COMX 230.

\*\*Electives must be chosen to meet GER (3 credits in Social Sciences & 6 credits in Humanities).

\*\*\* Professional electives are the classes that meet the Software Engineering degree focus areas (Professional electives on other side.)

\*\*\*\*WRIT 101 College Writing I can replace WRIT 121 Intro to Technical Writing. WRIT 325W Writing in the Sciences, WRIT 322W Advanced Business Writing can replace WRIT 321W.

★ Students in the Statistics Focus Area need to take STAT 332 before beginning the courses in the focus area.

## SOFTWARE ENGINEERING DEGREE FOCUS AREAS

Professional Electives --- Junior and Senior Years  
9 Credits for Each Focus Area

<b>Business Applications</b>					
			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
ACTG 201	Principles of Financial Accounting		3		_____
ACTG 202	Principles of Managerial Accounting			3	_____
<b>Senior Year</b>					
* BMKT 325W	Principles of Marketing			3	_____
* BGEN 235	Business Law		3		_____
* BMGT 335W	Management and Organization			3	_____
* BFIN 322	Business Finance		3		_____
* <i>select 1 course out of 4</i>					
<b>Electronic Control Systems</b>					
			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
EELE 201	Circuits I for Engineering (coreq M 172)		3		_____
* EELE 202	Circuits I for Engineering Lab (coreq EELE 201)		1		_____
* EELE 261	Intro. To Logic Circuits (prereq EELE 201, 202)			3	_____
* EELE 465	Microcontroller Applications (prereq CSCI 255) (even years only)			3	_____
<b>Senior Year</b>					
* PHSX 322	Electronics for Scientists (prereq PHSX 237, 238)			3	_____
* EELE 203	Circuits II for Engineering (prereq EELE 201, 202 & M 274)		4		_____
* EELE 320	Process Instrumentation and Control (prereq EELE 201 & 202)		4		_____
* EELE 317	Electronics (prereq EELE 203)			3	_____
* Geop 446	Applied Linear Systems (prereq M274)			3	_____
* <i>select 2 or more courses to reach a minimum of 9 elective credits within the focus area</i>					
<b>Engineering Applications</b>					
			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
EGEN 101	Introduction Engineering Calculations & Problem Solving		3		_____
EGEN 201	Statics (prereq PHSX 234)			3	_____
* EMEC 215	Intro to Modeling for Mechanical Engineers (prereq M172, EGEN 101)			1	_____
<b>Senior Year</b>					
* EGEN 202	Dynamics (prereq EGEN 201 & M 172)		3		_____
* EGEN 305	Mechanics of Materials (prereq EGEN 201 & M 172)		3		_____
* EGEN 306	Mechanics of Materials Lab (co-req EGEN 305)		1		_____
* EGEN 318	Computer Applications for Engineering (prereq EMEC 215, coreq EGEN 305)			2	_____
* <i>select 1 or more courses to reach a minimum of 9 elective credits within the focus area</i>					

### Statistical Applications

			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
	STAT 421	Probability Theory (every other year, prereq STAT 332)	3		_____
*	STAT 422	Mathematical Statistics (every other year, prereq STAT 421)		3	_____
*	STAT 441	Experimental Design (prereq STAT 332)	3		_____
*	STAT 432	Regression and Model Building (prereq STAT 332)		3	_____
<b>Senior Year</b>					
*	STAT 435	Statistical Computing & EDA (prereq STAT 332)		3	_____
*	STAT 453	Statistical Learning and Data Science I (every other year, prereq STAT 432)	3		_____
*	STAT 454	Statistical Learning and Data Science II (every other year, prereq STAT 453)		3	_____

\* select 2 courses out of 6

### Technical Communication

			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
*	PTC 3156	Digital Video Productions	3		_____
	MART 310W	New Media I	3		_____
+	WRIT 321W	Advanced Technical Writing		3	_____
+	WRIT 322W	Advanced Business Writing		3	_____
<b>Senior Year</b>					
*	CSCI 311	Data Driven Web Applications (prereq CSCI 135, or 110, or 114, or 112, or 117)		3	_____
*	COMX 442	History, Technology, & Communication		3	_____
+	WRIT 325W	Writing in the Sciences	3		_____
*	WRIT 350W	Technical Editing (prereq WRIT 321W, or 322W, or 325W)		3	_____
*	PTC 4406	New Media II		3	_____

+ in addition to GenEd 300-level writing requirement.

\* select 2 courses out of 8

### Game Development

			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
	PTC 330	Introduction to Game Design	3		_____
	MART 310W	New Media I	3		_____
	CSCI 441	Computer Graphics (prereq CSCI 332, M333)		3	_____
<b>Senior</b>					
	PTC 4406W	New Media II		3	_____
	CSCI 446	Artificial Intelligence (prereq CSCI 332)	3		_____
	CSCI 491	Special Topics - Computer Game Development		3	_____
	CSCI 492	Independent Study - Computer Game Development Project *	3		_____

Select 9 credits from listed courses; \*Project must be approved by CS faculty

## Bachelor of Science in COMPUTER SCIENCE

with

Name: \_\_\_\_\_

Choose One Focus Area Sophomore Year

- |   |   |
|---|---|
| <input type="checkbox"/> Business Applications      | <input type="checkbox"/> Statistical Applications |
| <input type="checkbox"/> Electronic Control Systems | <input type="checkbox"/> Technical Communications |
| <input type="checkbox"/> Engineering Applications   | <input type="checkbox"/> None                     |
| <input type="checkbox"/> Game Development           |   |

2020-2021

Fall Semester

Spring Semester

### FRESHMAN YEAR

			Credits	Sem	Grade
CSCI	135	Fund. of Computer Science I	3	_____	_____
CSCI	194	Freshman Seminar	1	_____	_____
M	171	Calculus I	3	_____	_____
WRIT	121	Intro to Technical Writing**	3	_____	_____
--	--	<i>Humanities Elective</i>	--	--	--
			3	_____	_____
--	--	<i>Social Science Elective</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>16</b>		

			Credits	Sem	Grade
CSCI	136	Fund. of Computer Science II	3	_____	_____
COMX	230	Presenting Technical Inf.**	3	_____	_____
M	172	Calculus II	3	_____	_____
CSCI	255	Intro. To Embedded Systems	3	_____	_____
--	--	<i>Science Elective*</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

### SOPHOMORE YEAR

CSCI	232	Data Struct & Algorithms	3	_____	_____
CSCI	246	Discrete Structures	3	_____	_____
M	273	Multivariable Calculus	4	_____	_____
--	--	<i>Science Elective*</i>	--	--	--
			4	_____	_____
<b>Total Credits</b>			<b>14</b>		

CSCI	332	Design and Analysis of Algor	3	_____	_____
M	274	Intro. to Differential Equations	3	_____	_____
M	333	Linear Alegbra	3	_____	_____
--	--	<i>Social Science Elective</i>	--	--	--
			3	_____	_____
--	--	<i>Science Elective*</i>	--	--	--
			4	_____	_____
<b>Total Credits</b>			<b>16</b>		

### JUNIOR YEAR

CSCI	305	Concepts of Prog. Languages	3	_____	_____
ESOF	322	Software Engineering	3	_____	_____
★STAT	332	Stats for Scientists & Engin	3	_____	_____
BMIS	375	Data Analytics	3	_____	_____
--	--	<i>Professional or Free Elective***</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

CSCI	361	Computer Architecture	3	_____	_____
ESOF	376	Security	3	_____	_____
M	410	Numerical Computing**	3	_____	_____
CSCI	440	Advanced Database	3	_____	_____
--	--	<i>Humanities Elective</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

### SENIOR YEAR

CSCI	446	Artificial Intelligence	3	_____	_____
CSCI	466	Networks	3	_____	_____
CSCI	498	Internship**	2	_____	_____
WRIT	321W	Advanced Technical Writing**	3	_____	_____
--	--	<i>Professional or Free Elective***</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>14</b>		

CSCI	438	Theory of Computation	3	_____	_____
CSCI	460	Operating Systems	3	_____	_____
CSCI	470	Web Science	3	_____	_____
CSCI	494	Senior Seminar	1	_____	_____
CSCI	498	Internship **	2	_____	_____
--	--	<i>Professional or Free Elective**</i>	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

*Minimum credits for B.S. degree in Computer Science = 120*

\*Science electives must include a two-semester sequence of laboratory science (min. of 11 credits total): Either (1) two of the three following sets (BIOB 101/102) or (BIOB 170) or (BIOE 305/306) plus 3 more science credits; (2) CHMY 141 w/lab 142, CHMY 143 w/lab 144 plus 3 more science credits; (3) GEO 101, GEO 257, GEO 259 plus 4 more science credits (4) PHSX 234, 235 w/lab 236, and PHSX 237 w/lab 238 (take the physics sequence for the Electronic Control Systems Option.)

\*\*WRIT 101 College Writing I can replace WRIT 121 Intro to Technical Writing. COMX 211 Adv. Public Speaking or COMX 111 Intro. to Public Speaking can replace COMX 230. CSCI 486 Senior Project can replace internship. WRIT 325W Writing in the Sciences or WRIT 322W Advanced Business Writing can replace WRIT 321W, M 426 Mathematical Modeling can replace M 410

\*\*\*Students may elect to pursue a 12-credit Computer Science degree focus area (reverse side) with free electives.

★ Students in the Statistics Option need to take STAT 332 before beginning the courses in the focus area.

# COMPUTER SCIENCE DEGREE FOCUS AREAS

Professional Electives --- Junior and Senior Years  
9 Credits for Each Focus Area

<b>Business Applications</b>					
	<i><b>Junior Year</b></i>		<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
	ACTG 201	Principles of Financial Accounting	3		
	ACTG 202	Principles of Managerial Accounting		3	
	<i><b>Senior Year</b></i>				
*	BMKT 325W	Principles of Marketing		3	
*	BGEN 235	Business Law	3		
*	BMGT 335W	Management and Organization		3	
*	BFIN 322	Business Finance	3		
<i>* select 1 course out of 4</i>					
<b>Electronic Control Systems</b>					
	<i><b>Junior Year</b></i>		<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
	EELE 201	Circuits I for Engineering (coreq M 172)	3		
*	EELE 202	Circuits I for Engineering Lab (coreq EELE 201)	1		
*	EELE 261	Intro. To Logic Circuits (prereq EELE 201, 202)		3	
*	EELE 465	Microcontroller Applications (prereq CSCI 255) (even years only)		3	
	<i><b>Senior Year</b></i>				
*	PHSX 322	Electronics for Scientists (prereq PHSX 237, 238)		3	
*	EELE 203	Circuits II for Engineering (prereq EELE 201, 202 & M 274)	4		
*	EELE 320	Process Instrumentation and Control (prereq EELE 201 & 202)	4		
*	EELE 317	Electronics (prereq EELE 203)		3	
*	GEOP 446	Applied Linear Systems (prereq M274)		3	
<i>* select 2 or more courses to reach a minimum of 9 elective credits within the focus area</i>					
<b>Engineering Applications</b>					
	<i><b>Junior Year</b></i>		<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
	EGEN 101	Introduction Engineering Calculations & Problem Solving	3		
	EGEN 201	Statics (prereq PHSX 234)		3	
*	EMEC 215	Intro to Modeling for Mechanical Engineers (prereq M172, EGEN 101)		1	
	<i><b>Senior Year</b></i>				
*	EGEN 202	Dynamics (prereq EGEN 201 & M 172)	3		
*	EGEN 305	Mechanics of Materials (prereq EGEN 201 & M 172)	3		
*	EGEN 306	Mechanics of Materials Lab (co-req EGEN 305)	1		
*	EGEN 318	Computer Applications for Engineering (prereq EMEC 215, coreq EGEN 305)		2	
<i>* select 1 or more courses to reach a minimum of 9 elective credits within the focus area</i>					



<b>Statistical Applications</b>					
<b>Junior Year</b>			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
	STAT 421	Probability Theory (every other year, prereq STAT 332)	3		_____
*	STAT 422	Mathematical Statistics (every other year, prereq STAT 421)		3	_____
*	STAT 441	Experimental Design (prereq STAT 332)	3		_____
*	STAT 432	Regression and Model Building (prereq STAT 332)		3	_____
<b>Senior Year</b>					
*	STAT 435	Statistical Computing & EDA (prereq STAT 332)		3	_____
*	STAT 453	Statistical Learning and Data Science I (every other year, prereq STAT 432)	3		_____
*	STAT 454	Statistical Learning and Data Science II (every other year, prereq STAT 453)		3	_____
<i>*select 2 courses out of 6</i>					
<b>Technical Communication</b>					
<b>Junior Year</b>			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
*	PTC 3156	Digital Video Productions	3		_____
	MART 310W	New Media I	3		_____
+	WRIT 321W	Advanced Technical Writing		3	_____
+	WRIT 322W	Advanced Business Writing		3	_____
*	CSCI 311	Data Driven Web Applications (prereq CSCI 135, or 110, or 114, or 112, or 117)		3	_____
<b>Senior Year</b>					
*	COMX 442	History, Technology, & Communication		3	_____
+	WRIT 325W	Writing in the Sciences	3		_____
*	WRIT 350W	Technical Editing (prereq WRIT 321W, or 322W, or 325W)		3	_____
*	PTC 4406	New Media II		3	_____
<i>+in addition to GenEd 300 level writing requirement.</i>					
<i>*select 2 courses out of 8</i>					
<b>Game Development</b>					
<b>Junior Year</b>			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
	PTC 330	Introduction to Game Design	3		_____
	MART 310W	New Media I	3		_____
	CSCI 441	Computer Graphics (prereq CSCI 332, M 333)		3	_____
<b>Senior</b>					
	PTC 4406W	New Media II		3	_____
	COMX 338	Usability Testing	3		_____
	CSCI 491	Special Topics - Computer Game Development		3	_____
	CSCI 492	Independent Study - Computer Game Development Project*	3		_____
<i>Select 9 credits from listed courses; *Project must be approved by CS faculty</i>					

## Bachelor of Science in SOFTWARE ENGINEERING

with

Name: \_\_\_\_\_

- Business Applications
- Electronic Control Systems Option
- Engineering Applications

- Statistical Applications
- Technical Communications Option
- Game Development

Choose One Focus Area Sophomore Year

### 2020 - 2021 Catalog

#### Fall Semester

#### FRESHMAN YEAR

			Credits	Sem	Grade
CSCI	194	Freshman Seminar	1	_____	_____
CSCI	135	Fund. of Computer Science I	3	_____	_____
M	171	Calculus I	3	_____	_____
WRIT	121	Intro to Technical Writing****	3	_____	_____
CHMY	141	College Chemistry I*	3	_____	_____
CHMY	142	College Chemistry I Lab *	1	_____	_____
--	--	Humanities Elective**	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>17</b>		

#### Spring Semester

			Credits	Sem	Grade
CSCI	136	Fund. of Computer Science II	3	_____	_____
COMX	230	Presenting Technical Information*	3	_____	_____
M	172	Calculus II	3	_____	_____
PHSX	234	General Physics - Mechanics	3	_____	_____
CSCI	255	Intro. To Embedded Systems	3	_____	_____
--	--	Humanities Elective**	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>18</b>		

#### SOPHOMORE YEAR

CSCI	232	Data Struct & Algorithms	3	_____	_____
CSCI	246	Discrete Structures	3	_____	_____
COMX	338	Usability Testing	3	_____	_____
M	273	Multivariable Calculus	4	_____	_____
PHSX	235	General Physics - H, S, & O	3	_____	_____
PHSX	236	General Physics-H, S, & O Lab	1	_____	_____
			17		
<b>Total Credits</b>			<b>17</b>		

CSCI	332	Design and Analysis of Algor.	3	_____	_____
ECNS	203	Principles of Micro and Macro	3	_____	_____
M	274	Intro to Differential Equations	3	_____	_____
PHSX	237	General Phys - Elect, Mag, & Wave	3	_____	_____
PHSX	238	General Phys-Elect, Mag, & Wave Lab	1	_____	_____
--	--	Social Science Elective**	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>16</b>		

#### JUNIOR YEAR

CSCI	305	Concepts of Programming Lang	3	_____	_____
BMIS	375	Data Analytics	3	_____	_____
ESOF	322	Software Engineering	3	_____	_____
★STAT	332	Statistics for Scientists & Engin	3	_____	_____
--	--	Professional Elective***	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

CSCI	361	Computer Architecture	3	_____	_____
ESOF	376	Security	3	_____	_____
ESOF	328	Requirements & Specifications	3	_____	_____
WRIT	321W	Adv. Technical Writing****	3	_____	_____
CSCI	440	Advanced Database	3	_____	_____
			15		
<b>Total Credits</b>			<b>15</b>		

#### SENIOR YEAR

CSCI	466	Networks	3	_____	_____
EGEN	325	Engr. Economic Analysis	3	_____	_____
ESOF	427	Software Design & Architecture	3	_____	_____
ESOF	486	Senior Design Project I	2	_____	_____
--	--	Free Elective	--	--	--
			1	_____	_____
--	--	Professional Elective***	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

CSCI	460	Operating Systems	3	_____	_____
CSCI	470	Web Science	3	_____	_____
ESOF	411	Software Verification & Validation	3	_____	_____
ESOF	487	Senior Design Project II	2	_____	_____
CSCI	494	Senior Seminar	1	_____	_____
--	--	Professional Elective***	--	--	--
			3	_____	_____
<b>Total Credits</b>			<b>15</b>		

Minimum credits for B.S. degree in Software Engineering = 128

\* BIOB 101 (Discover Biology) and BIOB 102 (Discover Biology Lab) or GEO 101 (Intro to Physical Geology) may be substituted for CHMY 141/142.

COMX 111 Intr to Public Speaking or COMX 211 Adv Public Speaking can replace COMX 230.

\*\*Electives must be chosen to meet GER (3 credits in Social Sciences & 6 credits in Humanities).

\*\*\* Professional electives are the classes that meet the Software Engineering degree focus areas (Professional electives on other side.)

\*\*\*\*WRIT 101 College Writing I can replace WRIT 121 Intro to Technical Writing. WRIT 325W Writing in the Sciences, WRIT 322W Advanced Business Writing can replace WRIT 321W.

★ Students in the Statistics Focus Area need to take STAT 332 before beginning the courses in the focus area.

## SOFTWARE ENGINEERING DEGREE FOCUS AREAS

Professional Electives --- Junior and Senior Years  
9 Credits for Each Focus Area

<b>Business Applications</b>					
			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
ACTG 201	Principles of Financial Accounting		3		_____
ACTG 202	Principles of Managerial Accounting			3	_____
<b>Senior Year</b>					
* BMKT 325W	Principles of Marketing			3	_____
* BGEN 235	Business Law		3		_____
* BMGT 335W	Management and Organization			3	_____
* BFIN 322	Business Finance		3		_____
<i>* select 1 course out of 4</i>					
<b>Electronic Control Systems</b>					
			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
EELE 201	Circuits I for Engineering (coreq M 172)		3		_____
* EELE 202	Circuits I for Engineering Lab (coreq EELE 201)		1		_____
* EELE 261	Intro. To Logic Circuits (prereq EELE 201, 202)			3	_____
* EELE 465	Microcontroller Applications (prereq CSCI 255) (even years only)			3	_____
<b>Senior Year</b>					
* PHSX 322	Electronics for Scientists (prereq PHSX 237, 238)			3	_____
* EELE 203	Circuits II for Engineering (prereq EELE 201, 202 & M 274)		4		_____
* EELE 320	Process Instrumentation and Control (prereq EELE 201 & 202)		4		_____
* EELE 317	Electronics (prereq EELE 203)			3	_____
* Geop 446	Applied Linear Systems (prereq M274)			3	_____
<i>* select 2 or more courses to reach a minimum of 9 elective credits within the focus area</i>					
<b>Engineering Applications</b>					
			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
EGEN 101	Introduction Engineering Calculations & Problem Solving		3		_____
EGEN 201	Statics (prereq PHSX 234)			3	_____
* EMEC 215	Intro to Modeling for Mechanical Engineers (prereq M172, EGEN 101)			1	_____
<b>Senior Year</b>					
* EGEN 202	Dynamics (prereq EGEN 201 & M 172)		3		_____
* EGEN 305	Mechanics of Materials (prereq EGEN 201 & M 172)		3		_____
* EGEN 306	Mechanics of Materials Lab (co-req EGEN 305)		1		_____
* EGEN 318	Computer Applications for Engineering(prereq EMEC 215, coreq EGEN 305)			2	_____
<i>* select 1 or more courses to reach a minimum of 9 elective credits within the focus area</i>					

### Statistical Applications

			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
	STAT 421	Probability Theory (every other year, prereq STAT 332)	3		_____
*	STAT 422	Mathematical Statistics (every other year, prereq STAT 421)		3	_____
*	STAT 441	Experimental Design (prereq STAT 332)	3		_____
*	STAT 432	Regression and Model Building (prereq STAT 332)		3	_____
<b>Senior Year</b>					
*	STAT 435	Statistical Computing & EDA (prereq STAT 332)		3	_____
*	STAT 453	Statistical Learning and Data Science I (every other year, prereq STAT 432)	3		_____
*	STAT 454	Statistical Learning and Data Science II (every other year, prereq STAT 453)		3	_____

\* select 2 courses out of 6

### Technical Communication

			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
*	PTC 3156	Digital Video Productions	3		_____
	MART 310W	New Media I	3		_____
+	WRIT 321W	Advanced Technical Writing		3	_____
+	WRIT 322W	Advanced Business Writing		3	_____
<b>Senior Year</b>					
*	CSCI 311	Data Driven Web Applications (prereq CSCI 135, or 110, or 114, or 112, or 117)		3	_____
*	COMX 442	History, Technology, & Communication		3	_____
+	WRIT 325W	Writing in the Sciences	3		_____
*	WRIT 350W	Technical Editing (prereq WRIT 321W, or 322W, or 325W)		3	_____
*	PTC 4406	New Media II		3	_____

+ in addition to GenEd 300-level writing requirement.

\* select 2 courses out of 8

### Game Development

			<u>Fall</u>	<u>Spring</u>	<u>Sem/Gr</u>
<b>Junior Year</b>					
	PTC 330	Introduction to Game Design	3		_____
	MART 310W	New Media I	3		_____
	CSCI 441	Computer Graphics (prereq CSCI 332, M333)		3	_____
<b>Senior</b>					
	PTC 4406W	New Media II		3	_____
	CSCI 446	Artificial Intelligence (prereq CSCI 332)	3		_____
	CSCI 491	Special Topics - Computer Game Development		3	_____
	CSCI 492	Independent Study - Computer Game Development Project *	3		_____

Select 9 credits from listed courses; \*Project must be approved by CS faculty

## Geological Engineering 440 – Geological Engineering ~~Geology~~ (3 credits)

Lecture: TR 12:30-1:20, MG 201

Lab: R 2-4:50, MG 201

Prerequisite: Physical Geology, Statics

Instructor: Dr. Mary MacLaughlin, MG 213B, mmaclaughlin@mtech.edu  
Office hours as posted or by appointment

Textbooks: *Geological Engineering*, Vallejo & Ferrer, CRC Press (2011). ISBN 978-0-415-41352-7.  
*Foundations of Engineering Geology, Second or Third Edition*, A.C. Waltham, Spon  
Publishing (2002 or 2009). ISBN 0-415-25450-7 or 978-0-415-46960-9.

Reference: *Introduction to Rock Mechanics, Second Edition*, RE Goodman, Wiley (1989).

Grading: Homework 15%  
Lab & Field Exercises 50%  
Exams (2) 35%

Lecture Topics:	Reading Assignment:(Vallejo & Ferrer)	(Waltham)
Introduction to engineering geology	Ch 1	pp 2-3, 50-51
Engineering characterization of rock	Ch 3, Ch 6	pp 52-55, 86-87, 14
Weathering	pp 125-129 + handout	pp 30-31
Stereonet & rock slope stability	Handouts	
Excavation & tunneling	Ch 10, Section 9.8	pp 80-83
Engineering characterization of soil	Ch 2 (skip sections 3 & 7), Ch 12	pp 56-57, 32-37
Site investigation and mapping	Ch 5, Ch 7	pp 16-19, 42-51
Erosion, erosion control & geosynthetics	Handouts	pp 32-33, 38-39
Ground improvement	Ch 8, p.491	pp 60-69
Landslides & slope stabilization	Ch 9, 13	pp 70-79
Dams & reservoirs	Ch 11	
Earthquakes	Ch 14	pp 22-23, 61

### Labs & Field Exercises (tentative):

Use of structure contours and stereographic projection  
Kinematic rock slope analysis & design  
Field Project #1: Highway 2 Roadcut\*  
Lab testing of rock: tilt test, point load test, UCS test, ultrasonic velocity test  
Lab testing of soil: gradation (sieve test), Atterberg limits  
Engineering geology information literacy  
Field project #2: Slope Stability Site Investigation & Analysis/Design\*  
Field trip\*: Montana Association of Dam & Canal Systems Conference  
or other approved professional meeting  
Computer labs: stereographic projection, slope stability analysis, erosion control  
Earthquake engineering lab  
Student presentations

\* Fieldwork and field trips are likely to span blocks of time outside of the normally scheduled class meetings due to travel, and may involve a Saturday site visit, depending on the weather.

**Course Objectives:** (1) To provide students with a broad overview of the concepts related to engineering characterization of geologic materials, and potential problems related to geologic materials and geologic hazards.  
(2) To provide students with the opportunity to participate in group field and laboratory projects which involve hands-on data collection, testing, analysis, and design.

**Course Outcomes:** (1) Students will be familiar with the engineering behavior and potential problems associated with various geological materials, as well as geological hazards which may impact construction projects.  
(2) Students will be able to collect rock mass discontinuity data in the field, perform an appropriate stereographic analysis, and design a safe slope.  
(3) Students will be knowledgeable about basic site investigation techniques.  
(4) Students will be able to solve basic problems related to dam stability.

After participating in this course, the student will be able to:

1. Articulate an accurate definition of engineering geology, and the relationships between engineering geology, geological engineering, geotechnical engineering, geomechanics, and civil engineering.
2. Demonstrate competency in the basic principles of geology and engineering.
3. Apply the principles of geology in an engineering context.
4. Classify geologic materials according to appropriate engineering classification schemes.
5. Determine the engineering properties of geologic materials.
6. Evaluate the suitability of geologic materials for use in engineering projects.
7. Design and conduct an effective site investigation.
8. Perform an engineering geologic analysis of site investigation data.
9. Identify natural and human-related geologic hazards and appropriate mitigation techniques.
10. Apply the concepts of engineering and geology to design safe excavations and structures.
11. Identify potential socio-economic and environmental impacts of engineering projects.
12. Demonstrate basic written and oral communications skills.
13. Function effectively as part of a team.
14. Apply critical thinking skills in the context of engineering geology.
15. Demonstrate an appreciation for life-long learning.

**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

## **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

### 1. *Faculty Approvals (directly to CRC, then Faculty Senate):*

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information) Required

Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite

Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required

Documents:

- Documents as listed under establishing a new course (as applicable)**
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

Other (for those that are considered in this level but otherwise not listed):

### 2. *Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):*

Placing a postsecondary educational program into moratorium: Required Documents:

- Program Termination and Moratorium Form**
- Academic Proposal Request Form

- Withdrawing a postsecondary educational program from moratorium. Required Documents:
  - Academic Proposal Request Form
- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form
- Other (for those that are considered in this level but otherwise not listed):

---

  - Academic Proposal Request Form

3. OCHE Approvals **Level I** (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Other (for those that are considered in this level but otherwise not listed):

---



- Academic Proposal Request Form

4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - Curriculum Proposal
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
- Curriculum Proposal
- Completed Intent to Plan Form

Date 10/08/2020

Dept. Business/Industry

College

Highlands College

Program Construction Technology AAS

CRC Representative Linda Granger

**Description of Request:** : In order to make a smoother transition for students going from the AAS in construction technology to the BAS in business with a construction management emphasis, we have sought out the expertise of the business department faculty and have added various business courses to the two-year degree so that our students are better prepared when they begin studies at the BAS level. We have also combined some of the construction courses and have deleted others as components are being taught in other areas.

**Current Course or Program Information:** Construction Technology AAS degree with CAS exit after two semesters.

Number (Assigned By CRC): \_\_\_\_\_

**Proposed Change(s)**

Course #	Name	Credits	Pre-req.
<b>Added Courses</b>			
•	WRIT 101 or WRIT 121 College Writing or Intro. to Tech. Writing		3
•	M 121 College Algebra (BAS Students)		3
•	M 105 Cont. Math (CAS and AAS Students)		3
•	CSTN 142 Interior and Exterior Finish Carpentry		4
•	CAPP 156 Microsoft Excel		3
•	BGEN 235 Business Law		3
•	BGEN 105 Introduction to Business		3
•	ACTG 201 Principles of Financial Accounting		3
•	ECNS 201 or ECNS 203 Prin. of Micro or Prin. of Micro and Macro		3
•	STAT 216 Introduction to Statistics		3
<b>Deleted Courses</b>			
•	WRIT 100 Composing Mindfully		3
•	M 090 or M 111 Introductory Algebra or Technical Math		4 or 3
•	PSYX 100 or Comx 115 Intro. to Psychology or Interpersonal Communication		3
•	CSTN 100 Fundamentals of Construction Technology		3
•	CSTN 145 Exterior Finishing, Stair, & Metal Stud Framing		4
•	CAPP 131 Basic MS Office		3
•	CSTN 220 Interior Finishing		4
•	CSTN 291 Special Topics		3

All of the aforementioned “added” courses are existing courses. Old and new curriculum sheets are attached.

**List of supporting documentation attached (See Level of Request for Requirements):**

N/A

**Assessment Leading to Request**

Students did not have enough coursework in the business area, which made the transition from the AAS in construction to the BAS in business with a construction emphasis more difficult.

**Anticipated Impacts to “Other” Programs**

North campus business faculty were instrumental in helping to formulate the new AAS curriculum, and they are aware of any impact to the affected business classes.

**Impact on Library:** No consultation is required since changes are only in the course numbers, course names, or course prerequisites.

**Date to take effect:** Upon approval.

## APPROVALS

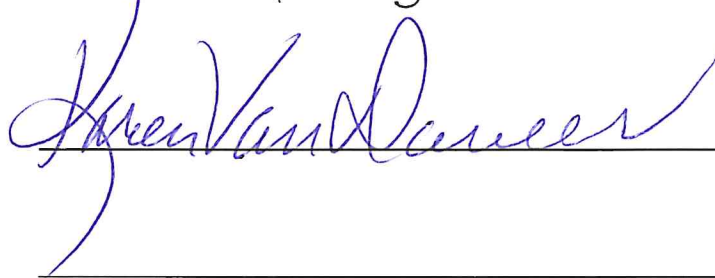
**Department Head Approval:**

Linda Granger

**Date:** 10/08/2020

**Dean Approval**

**Date** 10/08/2020



**Graduate Council Approval**

**Date** \_\_\_\_\_

**CRC Approval**

**Date** \_\_\_\_\_

**Faculty Senate Approval**

**Date** \_\_\_\_\_

**VCAA Approval (see below)**

**Date** \_\_\_\_\_

**Chancellor Approval (see below)**

**Date** \_\_\_\_\_

## Old Curriculum Sheet

### 1st Semester

---

- CSTN 120 - Carpentry Basics & Rough-In Framing 7 credits (5 credits required) (Level I) \*
- WRIT 100 - Composing Mindfully: Writing Fundamentals 3 credits
- CSTN 100 - Fundamentals of Construction Technology 3 credits \*
- 
- PSYX 100 - Introduction to Psychology 3 credits
- - OR -
- COMX 115 - Interpersonal Communication 3 credits
- 
- M 090 - Introductory Algebra 4 credits
- - OR -
- M 111 - Technical Mathematics 3 credits

**Total: 17 or 18**

---

### 2nd Semester

---

- CSTN 145 - Exterior Finishing, Stair, & Metal Stud Framing 4 credits \*\*
- CSTN 160 - Constructn Concepts & Building Lab 3 credits \*\*
- CAPP 131 - Basic MS Office 3 credits
- CSTN 250 - Construction Estimating 3 credits
- CSTN 147 - Blueprint Reading 3 credits

**Total: 16**

---

### 3rd Semester

---

- CSTN 170 - Site Layout 3 credits \*
- CSTN 201 - Advanced Concrete Working 5 credits \*
- CSTN 161 - Construction Concepts & Building Lab II 3 credits
- CSTN 271 - Construction Project Management 3 credits
- DDSN 114 - Introduction to CAD 3 credits \*
- MT 0220 - Employment Strategies 2 credits

**Total: 19**

---

### 4th Semester

---

- CSTN 260 - Construction Concepts & Building Lab II 3 credits
- CSTN 220 - Interior Finishing 4 credits \*\*
- CSTN 281 - Construction Project Management II 3 credits
- CSTN 291 - Special Topics 3 credits
- CSTN 251 - Building Methods and Materials 4 credits

**Total: 17**

## New Curriculum Sheet

CONSTRUCTION TECHNOLOGY AAS CURRICULUM SHEET			
COURSE NO.	TITLE	CREDITS	SEMESTER COMPLETED
<b>FIRST SEMESTER</b>			
*CSTN 120	Carpentry Basics & Rough-In Framing	4	
*BGEN 235	Business Law	3	
WRIT 101 <u>or</u> WRIT 121	College Writing I <u>or</u> Intro. To Technical Writing	3	
M 105 (CAS or AAS Students) <u>or</u> M 121 (BAS Students)	Contemporary Math	3	
CAPP 156	College Algebra	3	
	MS Excel	3	
<b>TOTAL CREDITS</b>		<b>16</b>	
<b>SECOND SEMESTER</b>			
**CSTN 142	Interior and Exterior Finish Carpentry	4	
**CSTN 160	Construction Concepts & Building Lab I	3	
**CSTN 250	Construction Estimating	3	
**CSTN 147	Blueprint Reading	3	
BGEN 105	Introduction to Business	3	
<b>TOTAL CREDITS</b>		<b>16</b>	
A student exiting program after second semester would be awarded a Certificate of Applied Science in Construction Technology.			
<b>THIRD SEMESTER</b>			
ACTG 201	Principles of Financial Accounting	3	
*CSTN 170	Site Layout	3	
*CSTN 201	Advanced Concrete Working	3	
*CSTN 161	Construction Concepts & Building Lab II	3	
*CSTN 271	Construction Project Management I	3	
<b>TOTAL CREDITS</b>		<b>15</b>	
<b>FOURTH SEMESTER</b>			
**CSTN 260	Construction Concepts & Building Lab III	3	
**CSTN 281	Construction Project Management II	3	
**CSTN 251	Building Methods and Materials	3	
ECNS 201 <u>or</u> ECNS 203	Principles of Microeconomics <u>or</u> Principles of Microeconomics and Macroeconomics	3	
STAT 216	Introduction to Statistics	3	
<b>TOTAL CREDITS</b>		<b>15</b>	
	<b>TOTAL CREDITS FOR FOUR SEMESTERS</b>	<b>62</b>	

\*Fall Only      \*\*Spring Only

**Montana Board of Regents**  
ACADEMIC PROPOSAL REQUEST FORM

SUBMISSION MONTH/YEAR

ITEM XXX-XXXXX

**ITEM TITLE**

---

Institution: Montana Technological University

CIP Code: \_\_\_\_\_

**Retitle Center for Advanced Mineral and Metallurgical Processing to Center for Advanced**

Program/Center/Institute Title: **Materials Processing**

---

Includes (please specify below): Face-to-face Offering: \_\_\_\_\_ Online Offering: \_\_\_\_\_ Blended Offering: \_\_\_\_\_

Options: \_\_\_\_\_

**Proposal Summary [360 words maximum]**

**What:** Montana Technological University requests authorization from the Montana Board of Regents to retitle the Center for Advanced Mineral and Metallurgical Processing to the Center for Advanced Materials Processing

**Why:** In the past, mineral and metallurgical processing was the primary activity of this center but the scope of the center's activities has enlarged significantly to include nanotechnology and nanofabrication, additive and agile manufacturing, metal casting, cold spray technology and other materials-related research and development. The activities of the center include investigators from chemistry, electrical engineering, mechanical engineering, environmental engineering as well as metallurgical and materials engineering. The proposed new name preserves the historical acronym "CAMP."

**Resources:** The retitling will not require resources.

---

**ATTACHMENTS**

Attachments

---

Please mark the appropriate type of request and submit with any additional materials, including those listed in parentheses following the type of request. For more information pertaining to the types of requests listed below, how to complete an item request, or additional forms please visit <http://mus.edu/che/arsa/academicproposals.asp>.

**A. Level I:**

**Campus Approvals**

**1a. Placing a postsecondary educational program into moratorium** (Program Termination and Moratorium Form)

**1b. Withdrawing a postsecondary educational program from moratorium**

**Montana Board of Regents**  
ACADEMIC PROPOSAL REQUEST FORM

\_\_\_\_\_ 2. Establishing, re-titling, terminating or revising a campus certificate of 29 credits or less

\_\_\_\_\_ 3. Establishing a B.A.S./A.A./A.S. area of study

\_\_\_\_\_ 4. Offering an existing postsecondary educational program via distance or online delivery

**OCHE Approvals**

\_\_\_\_\_ 5. Re-titling an existing postsecondary educational program

\_\_\_\_\_ 6. Terminating an existing postsecondary educational program (Program Termination and Moratorium Form)

\_\_\_\_\_ 7. Consolidating existing postsecondary educational programs (Curriculum Proposal Form)

\_\_\_\_\_ 8. Establishing a new minor where there is a major or an option in a major (Curriculum Proposal Form)

\_\_\_\_\_ 9. Revising a postsecondary educational program (Curriculum Proposal Form)

\_\_\_\_\_ 10. Establishing a temporary C.A.S. or A.A.S. degree program *Approval limited to 2 years*

\_\_\_\_\_ **B. Level II:**

\_\_\_\_\_ 1. Establishing a new postsecondary educational program (Curriculum Proposal and Completed Request to Plan Form)

\_\_\_\_\_ 2. Permanent authorization for a temporary C.A.S. or A.A.S degree program (Curriculum Proposal and Completed Request to Plan Form)

\_\_\_\_\_ 3. Exceeding the 120-credit maximum for baccalaureate degrees *Exception to policy 301.11*

\_\_\_\_\_ 4. Forming, eliminating or consolidating an academic, administrative, or research unit (Curriculum or Center/Institute Proposal and completed Request to Plan, except when eliminating or consolidating)

  X \_\_\_\_\_ 5. Re-titling an academic, administrative, or research unit



**Protocol:** The department requesting a curriculum change holds a discussion at the departmental level, and if agreed upon, the Department Chair, elevates the request to the Dean for approval. All changes to the catalog require CRC approval.

Final changes are made by the registrar after faculty senate approval and BOR approval, as needed.

See workflow document

<https://helpx.adobe.com/acrobat/how-to/convert-word-excel-paper-pdf-forms.html?set=acrobat--fundamentals--pdf-forms>

Guidance can be found at: <https://mus.edu/che/arsa/academicproposals.html>

Submission Requirements: All Submissions (checked by CRC):

- Electronic Copy (with the exception of signatures- no handwritten items)
- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
- Naming Convention as determined by CRC

## **LEVEL of Request**

Please indicate the type of request(s) by selecting *all that apply*:

1. *Faculty Approvals (directly to CRC, then Faculty Senate):*

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information) Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Curriculum Worksheet
- Pre-requisite or co-requisite

- Course Changes: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing. Required Documents:

- Course Number
- Course Outcomes
- Course Description
- Syllabus
- Pre-requisites or co-requisites
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Amend an existing degree program. Making changes to programs such as adding a writing course to a major, changing the list of accepted electives or removing a requirement of a minor. Required Documents:

Documents:

- Documents as listed under establishing a new course (as applicable)**
- Existing Curriculum Worksheet
- New Curriculum Worksheet, with changes highlighted

- Other (for those that are considered in this level but otherwise not listed):
- 

2. *Campus Approvals Level I (must be approved by the VCAA prior to CRC submission):*

- Placing a postsecondary educational program into moratorium: Required Documents:

- Program Termination and Moratorium Form
- Academic Proposal Request Form

- Withdrawing a postsecondary educational program from moratorium. Required Documents:

- Academic Proposal Request Form

- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a B.A.S./A.A./A.S. area of study. Required Documents:
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Offering an existing postsecondary educational program via distance or online delivery. Required Documents:
  - Academic Proposal Request Form

3. OCHE Approvals Level I (*must be approved by the VCAA and Chancellor prior to CRC submission*): Level I items are those requests for which the Board of Regents has fully designated approval authority to the institution or Commissioner of Higher Education. These requests are to be submitted for notification to or approval by Commissioner as Level I proposals. Level I proposals may be submitted to OCHE at any time by the flagship campuses or community colleges and will be processed on a rolling monthly schedule. The approval of such proposals will be conveyed to the Board of Regents at the next meeting of the board. Level I proposals include campus initiatives typically characterized by minimal costs, clear adherence to approved campus mission, and the absence of significant programmatic impact on other institutions within the MUS and community colleges. BOR Forms can be found using the following link:

<https://mus.edu/che/arsa/Forms/AcademicForms.html>

- Re-titling an existing postsecondary educational program. Required Documents:
  - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
  - Academic Proposal Request Form
  - Program Termination and Moratorium Form
- Consolidating existing postsecondary educational programs
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Establishing a new minor where there is a major or an option in a major
  - Academic Proposal Request Form
  - Curriculum Proposal Form
  - Documents as listed under establishing a new course (see section 1)**
- Revising a postsecondary educational program
  - Curriculum Proposal Form
  - Academic Proposal Request Form
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**

4. Level II (*must be approved by the VCAA and Chancellor prior to CRC submission*):

Level II proposals require initial approval and comment by the Board of Regents through a Request to Plan prior to final review and approval by the Office of the Commissioner of Higher Education. These proposals entail more substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other MUS institutions and community colleges.

- Establishing a new postsecondary educational program

- Request to Plan (RTP)
- Academic Proposal Request Form
- Curriculum Proposal
- Fiscal Analysis Form
- Completed Intent to Plan Form
- Documents as listed under establishing a new course (see section 1)**
- Permanent authorization for a temporary C.A.S. or A.A.S degree program
  - Academic Proposal Request Form
  - C.A.S/A.A.S Curriculum Proposal
  - Fiscal Analysis Form
  - Completed Intent to Plan Form
  - Documents as listed under establishing a new course (see section 1)**
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
  - Academic Proposal Request Form
  - Documents as listed under establishing a new course (see section 1)**
- Forming, eliminating or consolidating an academic, administrative, or research unit
  - Academic Proposal Request Form
  - Curriculum or Center/Institute Proposal
  - Completed Request to Plan, except when eliminating or consolidating
  - Documents as listed under establishing a new course (see section 1)**
- Re-titling an academic, administrative, or research unit Permanent authorization for a temporary C.A.S. or A.A.S degree program
- Curriculum Proposal
- Completed Intent to Plan Form

Date 20 November 2020

Dept. CAMP

Program N/A

College Research Affairs Office

CRC Representative N/A

Description of Request: \_\_\_\_\_

Retitle Center for Advanced Mineral and Metallurgical Processing to Center for Advanced Material Processing

Current Course or Program Information: \_\_\_\_\_

This request (see Academic Proposal Request Form) was approved by the Research Advisory Committee on November 12, 2020.

Number (Assigned By CRC): N/A

**Proposed Change**

Course #	Name	Credits	Pre-req.
<p>This should include what will appear in the catalog, exactly. New course require course outcomes listed in this area.</p>			

List of supporting documentation attached (See Level of Request for Requirements):

## Assessment Leading to Request

In the past, mineral and metallurgical processing was the primary activity of this center but the scope of the center's activities has enlarged significantly to include nanotechnology and nanofabrication, additive and agile manufacturing, metal casting, cold spray technology and other materials-related research and development. The activities of the center include investigators from chemistry, electrical engineering, mechanical engineering, environmental engineering as well as metallurgical and materials engineering. The proposed new name preserves the historical acronym "CAMP."

## Anticipated Impacts to "Other" Programs

This request will not require additional resources and does not impact other programs.

**Impact on Library:** N/A has consulted with \_\_\_\_\_ at the Montana Tech library to ensure needed materials and media are available. (Or No consultation is required since changes are only in the course number, course name, or course pre-requisites.)

**Date to take effect (note that the earliest date is the next calendar year):** Upon approval by the Board of Regents.

# MontanaTech

Curriculum Change Request Form Dated August 15, 2020

## APPROVALS

Department Head Approval  
Date \_\_\_\_\_

N/A

Dean Approval  
Date \_\_\_\_\_

N/A

Graduate Council Approval  
Date \_\_\_\_\_

N/A

**RAC**  
**ERC** Approval  
Date 11/12/20

N/A Research Advisory Committee Approval 11/12/2020



Faculty Senate Approval  
Date \_\_\_\_\_

VCAA Approval (see below)  
Date 11/19/2020

 11/19/2020

Chancellor Approval (see below)  
Date \_\_\_\_\_

