

Faculty Senate Agenda

4/26/24

Noon

Mill 201

- I. Welcome and minutes
 - a. Review of 4/12/24 minutes
 - b. Welcome of New and Returning Senators

Action Items

- II. Emerita Request – Dr. Apple
- III. CRC Requests
 - a. Geological Engineering
 - b. Computer Science (Cybersecurity)
 - c. Nursing
 - d. Environmental Engineering
 - e. Mining Engineering (Freshman Engineering)
 - f. Metallurgical & Materials Engineering (signatures?)
 - g. Petroleum Engineering
 - h. Industrial Hygiene (signatures forthcoming)
 - i. Mechanical Engineering
 - j. Civil Engineering (Construction Management)
- IV. Senate Elections
 - a. Secretary
 - b. Vice Chair
 - c. Chair

Informational Items

- V. 2024 Satisfaction Survey open until May 3rd:
https://montanatech.co1.qualtrics.com/jfe/form/SV_1Y1nltNyc21Yp2m

Discussion Items

- VI. Safety Committee and Campus Laboratory Safety Discussion with Marissa Morgan
- VII. Employee Retention and Turnover Discussion with Vanessa Van Dyk
- VIII. For the Good of the Order

Faculty Senate Minutes

4/12/24

4 p.m.

Mill 201

Senators in attendance: S. Risser, D. Autenrieth, C. Gammons, A. Traut, J. Herndon, D. Galarus, S. Rosenthal, R. LaDouceur, G. Wallace, B. Hill, J. Kirtley, M. Egloff, S. Juskiewicz

- I. Minutes from the previous meeting were reviewed. The word “interim” will be removed from the minutes. A motion was made and seconded to approve the minutes, and that motion passed without further discussion.

Action Items

- II. Emeriti / Emeritae Requests were discussed. A separate motion to recommend the following faculty members for Professor Emeritus was made, seconded, and passed without discussion.
 - a. Roger Jensen
 - b. Jon Reiten
 - c. Susan Vuke
 - d. Paul Conrad
- III. CRC requests from the following meeting dates were discussed. A motion was made and seconded to adopt all of the recommendations in full. The motion passed after some discussion.
 - a. Masters of Project Engineering and Management (3/7)
 - b. Civil Engineering (3/7)
 - c. Computer Science (3/7)
 - d. Geological Engineering – BS (3/7)
 - e. Software Engineering (3/7)
 - f. Geological Engineering – BS (4/1)
 - g. Geological Engineering – MS (4/1)
 - h. Geological Engineering – UAV (4/1)
 - i. Automotive Technology – AAS and Spring AAS (4/1)
 - j. Pre-Apprentice Line (4/1)
 - k. Biological Sciences (4/1)
- IV. Selection of members for the subcommittee assigned to work on the Research Faculty and Staff Procedures was discussed. A list of potential subcommittee members was provided. Senators voted for subcommittee membership via secret ballot. The selected subcommittee members were:
 - a. Grant Wallace
 - b. Courtney Young
 - c. Jessica Andriolo
 - d. Julie Muretta

Informational Items

- V. Departmental Senator Elections (or Reelections) was discussed. The following senators have been elected/reelected by their departments:
 - Business – None named
 - Chemistry – John Kirtley (2024-2026)

Writing – Glen Southergill (2024-2027)

Trades – Jason Herndon (2024-2026)

Computer Science, Cybersecurity, & Network Administration – Doug Galarus (2024-2026)

Electrical Engineering - Bryce Hill (2024-2026)

Environmental Engineering – Raja Nagisetty (2024 – 2026)

Research Faculty (non-MBMG) – Gary Wyss (2024-2026)

Discussion Items

- VI. Spring 2024 Faculty Survey was discussed. A motion was made to adopt the 2021 survey questions for the 2024 survey. That motion was seconded and passed without discussion.
- VII. For the Good of the Order – Senators wishing to nominate officers for Faculty Senator officer positions should discuss with those who they are nominating prior to the next meeting.
- VIII. The meeting adjourned at 4:30PM

Date 4/23/24

ITEM NNN-NNNN-RNNNN

Authorization to Confer the Title of Professor Emeritus of Biological Sciences; Montana Technological University

THAT

Upon the occasion of the retirement of Dr. Martha Apple from the faculty of Montana Technological University, the faculty wishes to express its appreciation for her years of dedicated and valued service to the institution, the Department of Biological Sciences, and the state of Montana by recommending the rank of Professor Emeritus in the Department of Biological Sciences be conferred upon her by the Board of Regents of the Montana University System.

EXPLANATION

Professor Apple earned a B.A. in Botany and a B.A. in Geography at the University of Montana in 1981, her M.A. in Botany from the University of Montana in 1985, and her Ph.D. in Biology from the University of Rhode Island in 1994.

From 1995-1998, Dr. Apple was a postdoctoral research associate with the US Environmental Protection Agency in Corvallis Oregon, followed by a postdoctoral research associate position at the University of Nevada Reno from 2001-2002. Dr. Apple came to Montana Tech as an Assistant Professor in the Biological Sciences Department in 2003. She was promoted to Associate Professor in 2006 and to Professor in 2014. Dr. Apple has developed and taught a wide variety of classes in the Department's degree programs, specifically Plant Ecology, General Botany, Rocky Mountain Flora, Field Botany, Plant Physiology, Discover Biology, Cell Biology, Mountain Ecology, Biological Illustration, Microbiology for Health Sciences, General Microbiology, and Sophomore Seminar.

Dr. Apple's research focuses on Plant Ecology/Physiology, and/or Microbiology in the context of climate change. She established long term monitoring sites in southwest Montana for the Global Research Initiative in Alpine Environments (GLORIA). Dr. Apple's research portfolio includes two book chapters, 1 field manual, 4 conference proceedings, and 25 publications within respectable journals. She has involved undergraduate and graduate students in her research including publications and conference presentations. Dr. Apple is also a member of the Mountain Research Initiative's Resilience Working Group and the Elevation Dependent Climate Change Working Group.

Dr. Apple's tenure at Montana Tech can be characterized as excellent with significant service to the University for which she is to be commended. For these and numerous other contributions, the Department of Biological Sciences are honored to nominate Dr. Martha Apple for the rank of Professor Emeritus of Biological Sciences at Montana Technological University.

CURRICULUM VITAE

Martha E. Apple, Ph.D.
Professor, Department of Biological Sciences
Montana Technological University
Butte, Montana 59701 USA
mapple@mtech.edu

(406) 496-4575

Affiliations

Earth Science Information Partners (ESIP), Envirosensing Cluster,
Elevation Dependent Climate Change Working Group, Mountain Research Initiative
Mountain Resilience Working Group, Mountain Research Initiative
Global Research Initiative in Alpine Environments (GLORIA)
MtnClim Mountain Climate Group (co-editor of the Mountain Views Chronicle)
American Geophysical Union

Research Interests:

Alpine Plant Ecology in the Context of Climate Change, Plant Functional Traits and
Microbes in Alpine Systems and in Mining Impacted Areas, GLORIA (Global
Observation Research Initiative in Alpine Environments), Environmental Sensors,
Data Visualization, Responses of Plants to Elevated CO₂, Mycorrhizae, Tree
Physiology, Microscopy, Adhesion of Marine Red Algal Spores.

Classes Taught:

General Botany and Lab, Plant Ecology and Lab, Plant Physiology and Lab, Cell
Biology and Lab, General Microbiology, Microbiology for Health Sciences,
Microbiology Lab, Biological Illustration, Discover Biology, Sophomore Seminar,
Rocky Mountain Flora, Mountain Ecology, Field Botany

Roles:

Co-editor, Mountain Views Chronicle, present.
Session Chair, Elevation Dependent Climate Change Workshop, International
Mountain Conference, Innsbruck, Austria, 2022
Co-convenor, ESIP Envirosensing Cluster, 2021-2023
Assistant Editor, Intermountain Journal of Science, (former)
President, The Pacific Northwest Microscopy Society, 2001

Awards:

Merit Award, Montana Technological University. 2017.

Distinguished Researcher Award. Montana Technological University. 2011.
National Research Council Postdoctoral Award.1995-1998.

Education

Ph.D., Biology, University of Rhode Island, Kingston, RI, 1994.
Histochemistry of Spore Mucilage and Inhibition of Spore Adhesion in *Champia parvula*, a Marine Red Alga, Dr. Marilyn M. Harlin, Major Professor.

M.A., Botany, University of Montana, Missoula, MT, 1985.
Phenology of Equisetum, Dr. David E. Bilderback, Major Professor.

B.A., Botany, with honors, University of Montana, Missoula, MT, 1981.

B.A., Geography, with honors, University of Montana, Missoula, MT, 1981

Experience

Professor, 2014 - Present
Associate Professor, 2006 – 14
Assistant Professor, 2003 - 2006.
Department of Biological Sciences,
Montana Technological University, Butte, Montana.

Postdoctoral Research Associate, 2001-02.
Environmental and Resource Sciences,
University of Nevada, Reno, Nevada.

National Research Council Postdoctoral Research Associate, 1995-98
United States Environmental Protection Agency, Corvallis, Oregon

Publications

Peer-reviewed Journal Articles:

Biodiversity in mountain soils above the treeline. In revision. Nadine Praeg, Michael Steinwandter, Davnah Urbach, Mark A. Snethlage, Rodrigo P. Alves, Martha E. Apple, Andrea J. Britton, Estelle P. Bruni, Ting-Wen Chen, Kenneth Dumac, Fernando Fernandez-Mendoza, Michele Freppaz, Beat Frey, Nathalie Fromin, Stefan Geisen, Martin Grube, Elia Guariento, Antoine Guisan, Qiao-Qiao Ji, Juan J. Jiménez, Stefanie Maier, Lucie A. Malard, Maria A. Minor, Cowan C. Mc Lean, Edward A.D. Mitchell, Thomas Peham, Roberto Pizzolotto, Andy F. S. Taylor, Philippe Vernon,

Johan J. van Tol, Yunga Wu, Donghui Wu, Zhijeng Xie, Bettina Weber, Paul Illmer, Julia Seeber. Preprint: DOI:[10.1101/2023.12.22.569885](https://doi.org/10.1101/2023.12.22.569885)

Mountain Resilience: A Systematic Literature Review and Paths to the Future. 2022. Wyss R, Luthe T, Pedoth L, Schneiderbauer S, Adler C, Apple M, Acosta EE, Fitzpatrick H, Haider J, Ikizer G, Imperiale AJ, Karanci AN, Posch E, Saidmamatov O, Thaler T. *Mountain Research and Development* 42(2): A23-A36. DOI:10.1659/MRD-JOURNAL-D-21-00044.1

Effects of Climate and Atmospheric Nitrogen Deposition on Early to Mid-Term Stage Litter Decomposition Across Biomes. 2021. Taeoh Kwon, Hidaeki Shibata, Sebastian Kepfer Rojas, Inger K. Schmidt, Klaus S. Larsen, Claus Beier, Björn Berg, Kris Verheyen, Jean-Francois Lamarque, Frank Hagedorn, Nico Eisenhauer, Ika Djukic and TeaComposition Network (including Martha Apple). *Frontiers in Forests and Global Change*: (4). DOI: 10.3389/ffgc.2021.678480

On the impact of the COVID-19 pandemic on alpine research projects in Montana. 2021. Apple M. *EcoMont* 13(1):67-70. DOI: 10.1553/eco.mont-13-1s67

Plant functional traits and microbes vary with position on periglacial patterned ground at Glacier National Park, Montana. 2019. Apple M, Ricketts M, Martin AC. *Journal of Geographic Sciences* 29(7):1127-1141. DOI:10.1007/s11442-019-1649-3

Quantification of Cell Concentration in Biofuel-Important Microalgae Using Hyperspectral Reflectance and Hyperspectral Extinction Coefficient. 2019. Zhou Z, Zhou X, Apple ME, Miao J, Wyss G, Spangler L. *Int. J. Remote Sensing*. 40(23):8764-8792.

Early-stage litter decomposition across biomes. 2018. Djukic, I., *et al.* (including M Apple). *Science of the Total Environment* 628-629:1369-1394.

Bulk electric conductivity response to soil and rock CO₂ concentration during controlled CO₂ release experiments: Observations and analytic modelling. 2015. Jewell, S., Zhou, X., Apple, M., Dobeck, L. M., Spangler, L. H., Cunningham. A. B. [Geophysics](https://doi.org/10.1190/geo2014-0118.1) 80(6): E293-E308. DOI: 10.1190/geo2014-0118.1

Physiological responses of dandelion and orchard grass leaves to experimentally released upwelling soil CO₂. 2014. Sharma B, Apple M, Zhou X, Olson JM, Dorshorst C, Dobeck LM, Cunningham AB, Spangler LH. *Int. J. Greenhouse Gas Control* 24:139-148.

Alpine Plants and Climate Change. 2014. Apple, M. *The Montana Professor* 24:1.

Observed response of soil O₂ concentration to leaked CO₂ from an engineered CO₂ leakage experiment. 2013. Zhou, X., Apple, M., Dobeck, L.M., Cunningham, A. B., Spangler, L. H. *Int. J. Greenhouse Gas Control* 16:116-128.
DOI: 10.1016/j.iggc.2013.03.005

Experimental observation of signature changes in bulk soil electrical conductivity in response to engineered surface CO₂ leakage. 2012. Zhou, X., Wielopolski, L., Lakkaraju, V., Apple, M., Dobeck, L., Gullickson, K., Shaw, J., Cunningham, A., B., Spangler, L. H. *Int. J. Greenhouse Gas Control* 7:20-29. DOI: [10.1016/j.iggc.2011.12.006](https://doi.org/10.1016/j.iggc.2011.12.006)

Phenology and growth of shoots, needles, and buds of Douglas-fir seedlings with elevated CO₂ and (or) temperature. 2011. Olszyk, D., Wise, C., VanEss, E., Apple, M., Tingey, D. *Canadian J. Botany* 76(12):1991-2001. DOI: 10.1139/b98-169.

Studying the vegetation response to simulated leakage of sequestered CO₂ using spectral vegetation indices. 2010. Lakkaraju, V. R., Zhou, X., Apple, M., Cunningham, A., Dobeck, L. M., Gullickson, K., Spangler, L. H. *Ecological Informatics* 5(5):379-389. DOI: 10.1016/j.ecoinf.2010.05.002

Using hyperspectral plant signatures for CO₂ leak detection during the 2008 ZERT CO₂ sequestration field experiment in Bozeman, Montana. 2010. Male, E.J., Pickles, W.L., Silver, E., Hoffman, G., Lewicki, J., Apple, M., Repasky, K., Burton, E. *Environmental Earth Sciences* 60(2):251-261. DOI:10.1007/s12665-009-0372-2.

The effects of elevated CO₂ on root respiration rates of two Mojave Desert shrubs. 2010. Clark, N.M., Apple, M.E., Nowak, R.S. *Global Change Biology* 16:1566-1575.

Two new morphotypes of *Pinus elliottii*: Discrimination by macromorphological and anatomical traits. 2009. Shayanmehr, F., Ialali, S.G., Ghanati, F., Kartoolinejad, D., Apple, M. *Dendrobiology* 61(1):27:36.

Arbuscular Mycorrhizal Colonization of *Larrea tridentata* and *Ambrosia dumosa* Roots Varies with Precipitation and Season in the Mojave Desert. 2005. Apple M, Thee, C, Longozo V, Cogar C, Wells C, Nowak R. *Symbiosis* 39:131-136.

Xeromorphy increases in shoots of *Pseudotsuga menziesii* (Mirb.) Franco seedlings with exposure to elevated temperature but not elevated CO₂. 2005.

Olszyk, D., Apple, M., Gartner, B. L., Spicer, R., Wise, C., Buckner, E., Benson-Scott, A., Tingey, D. *Trees* 19(5):552-563. DOI: 10.1007/s00468-005-0414-7.

Needle Anatomy Varies with Increasing Tree Age in Douglas fir. Special Issue: Age-Related Change in Structure and Function of Trees and Forests in the Pacific Northwest. 2002. Apple, M, Tiekotter, K, Snow, M, Young, J, Tingey, D, Soeldner, A, Bond, B. J. *Tree Phys.* 22:181-189

Morphology and Stomatal Function of Douglas Fir Needles Exposed to Climate Change: Elevated CO₂ and Temperature. 2002. Apple, M., Olszyk, D., Ormrod, D. P., Lewis, J. D., Southworth, D. Tingey, D. T. *Int. J. Plant Sci* 161(1):127-132. DOI:10.1086/314237.

Internal temperature of Douglas-fir buds is altered at elevated temperature.

Apple, M. E., 1999. Lucash, M. S., Phillips, D. L., Olszyk, D. M., Tingey, D. T. *Env. Exp. Botany* 41:25-30.

Morphogenesis of *Pseudotsuga menziesii* buds is altered at elevated temperature but not at elevated CO₂. 1998. Apple, M. E., Lucash, M. S., Olszyk, D.M., Tingey D.T. *Env. Exp. Botany* 40:159-172.

Characterization of *Champia parvula* (Rhodophyta) tetraspore mucilage and rhizoids with histochemical stains and FITC-labelled lectins. 1996. Apple, M. E., M. M. Harlin, and J. H. Norris. *Phycologia* 35:245-252.

Inhibition of tetraspore adhesion in *Champia parvula* (Rhodophyta). 1995.

Apple, M. E., Harlin, M. M. *Phycologia* 34(5): 417:423. DOI:10.2216/10031-8884-34-5-417.1

Book Chapters:

Distance from Retreating Snowfields Influences Alpine Plant Functional Traits at Glacier National Park, Montana. 2021. Apple ME, Ricketts MK, Martin AC, Moritz DJ IN *Mountain Landscapes in Transition: Effects of Land Use and Climate Change*, Springer Nature Switzerland AG, Surag Mal, ED. DOI: [10.1007/978-3-030-70238-0_12](https://doi.org/10.1007/978-3-030-70238-0_12)

Aspects of Mycorrhizae in Desert Plants, Chapter 6, IN Desert Plants: Biology and Biotechnology. Apple M. E. 2010. Edited by R. K. Ramawat, Springer, Berlin. pp.121-134.

Conference Papers:

Microalgae and Crop Bio-Fertilization. 2018. Olakunle Richard Ogunsakin, Martha Apple [Frontiers in Chemistry](#) 6 DOI: 10.3389/conf.fchem.2018.01.00053

Visual Simulations Correlate Plant Functional Trait Distribution with Elevation and Temperature in the Cairngorm Mountains of Scotland. 2017. Valles, D., Apple, M. E., and Andrews, C. Int. Symposium on Computation Biology (CSCI-ISCB'17), Las Vegas, Nevada. DOI: 10.1109/CSCI.2017.220

Rhizomes and Roots of Rare Arctic-Alpine Snowfield Plants on the Edges of Retreating Snowfields at Glacier National Park, Montana. 2015. Apple, M., Ricketts, M. K., Carlson. L. G. [Microscopy and Microanalysis](#) 21(S3):709-710. DOI: 10/1017/S1431927615004341

Modeling Plant Functional Traits and Elevation in the Cairngorm Mountains of Scotland. 2015. Valles D, Apple M, Dick J, Andrews C, Pauli H. Modeling, Sim and Vis. Methods MSV'15 3.

Reports and Other Articles:

Measuring Impacts to Rare Peripheral Arctic-Alpine Plants at the Edges of Permanent Snowfields/Glaciers that are Receding due to Climate Change in Glacier National Park. Apple, M. 2012.
http://www.cfc.umt.edu/CESU/Reports/NPS/UMT/2012/12Apple_GLAC_rare%20plants_fnl%20rpt.pdf

Visualization of *in-situ* Douglas fir roots and ectomycorrhizae in the context of phytoremediation of acid mine wastes. 2007. Apple, M., Waring, T., Nandi, S. US EPA Mine Waste Technology Program

Montana Tech professor, students present at AGU Fall Meeting. Ouellet, N. 2016.
<https://www.mtech.edu/news/2015/01/012220141.html>

The GLORIA Plant Functional Traits Working Group. Apple, Martha E. 2011. Mountain Views, The Newsletter of the Consortium for Integrated Climate Research in Western Mountains, CIRMOUNT (5) 1:26-27. Connie Millar, Ed. Invited.

Field Manual:

Pauli, H., Gottfried, M., Lamprecht, A., Neissner, S., Rumpf, S., Winkler, M., Steinbauer, K., Grabherr, G., Coordinating Authors and Editors, Apple, M., (Contributing Author). 2015. The GLORIA field manual – standard Multi-Summit approach, supplementary methods and extra approaches. 5th Edition. Publisher: GLORIA-Coordination, Austrian Academy of Sciences & University of Natural Resources and Life Sciences, Vienna. ISBN: 978-92-79-45694-7

Phenology Data Sets:

Syednasrollah, B., A.M. Young, K. Hufkens, T. Milliman, M.A. Friedl, S. Frohking, A.D. Richardson, M. Abraha, D.W. Allen, M. Apple, M. et al. 2019. PhenoCam Dataset v2.0: Vegetation Phenology from Digital Camera Imagery, 2000-2018. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1674>

Milliman, T., B. Syednasrollah, A.M. Young, K. Hufkens, M.A. Friedl, S. Frohking, A.D. Richardson, M. Abraha, D.W. Allen, M. Apple, M. et al. 2019. PhenoCam Dataset v2.0: Digital Camera Imagery from the PhenoCam Network, 2000-2018. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1689>

Selected Presentations:

Apple, M. 2024. Alpine Plants at the SW Montana GLORIA Site. United States Forest Service Botany Meeting. Invited.

Apple, M. E., Moore, K. E., Zhou, X., Pal, R., Graff, J., Tanka, M., Griffin, J., Rasschaert, N., Peltomaa, A., and the Badger Mine Research Team (The Alpine Plant Processes Lab of Ecology (APPLE) Lab. The Badger Project: Succession, Patterned Ground, and Restoration at a Mountain Mine. American Geophysical Union Fall Meeting.

Apple, M. E. *et al.* 2022. The predictive value of variations in plant functional traits and snow cover with position on polygonal periglacial patterned ground in the Pintler Mountains of Montana. International Mountain Conference, Innsbruck, Austria.

Apple, M.E. *et al.* 2022. Changes in the relative percent cover of alpine plant species and qualitative plant functional traits with increased soil temperatures at the SW

Montana GLORIA target region. International Mountain Conference, Innsbruck, Austria.

Gallagher, J., Apple, M., Ehlers, J., Rubalcaba, J., Negus, K High Altitude Soil Testing (HAST): Increasing Accessibility of Data from the Alpine Tundra and Other Remote Locations as a Factor in Resilience. International Mountain Conference, Innsbruck, Austria

Apple, M. 2022. Insights on GLORIA Sites. Montana Native Plant Society Conservation Conference. Virtual. Invited.

Apple, M., Negus, K., Gallagher, J., Ehlers, J., Rubalcaba, J., Vendetti, T., Croft, S., Fiechtner, C. 2021. High Altitude Sensor Technology: HAST. UAS Virtual Seminar, Montana Tech.

Apple, M., Negus, K., Gallagher, J. 2021. Alpine Ecology, Environmental Sensors, and Resilience in the Northern Rocky Mountains of Montana. Mountain Resilience Working Group Meeting, Virtual.

Apple, M., Gallagher, J., Winscot, K., Apple, C. 2020. Alpine Plant Functional Traits Change with Increased Soil Temperature at the SW Montana GLORIA Target Region. American Geophysical Union (AGU) Fall Meeting, Virtual.

Apple, M., Gallagher, J., Winscot, K., and Negus, K. 2019. Plant Functional Traits Vary with Temperature on Periglacial Patterned Ground in the Rocky Mountains of Montana. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.

Fuka, D.R., Apple, M.E., Fulker D.W., Potter, N., Duerr D., Wagena, M.B., Lingerfelt, E., Gallagher, J.H.R., Daniels, M.D., Ameko, A., Peckham, S.D., Stamps, S., White R.R., Neumiller, K., Bock, E.M. and Easton Z.M. 2019. IoT Sensors and Their Pathway to HPC. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.

Apple, M., Valles, D., Ricketts, M., and Gallagher, J. 2019. What Drives the Variation of Plant Functional Traits on Periglacial Patterned Ground and Along Elevational Gradients? International Mountain Conference, Innsbruck, Austria.

Apple, M. E. 2019. Sensors in the Snow. ESIP (Earth Science Information Partners) Summer Meeting, Tacoma, WA.

Apple, M. E. 2019. Plant Functional Traits and Microbes Vary on Periglacial Patterned Ground at Glacier National Park. Invited Seminar, University of Montana's Systems Ecology Group.

Apple, M. E., and Valles, D. 2018. The RAPT Model Predicts Resilience and Vulnerability of Boreal Plant Species to Climate Change in the Cairngorm Mountains of Scotland. AGU Fall Meeting, Washington, D.C.

Apple, Martha E., Ricketts, Macy K., Winscot, Kurtiss., Negus, Kevin. 2018. Does soil temperature influence plant functional trait and microbial distribution on periglacial patterned ground in the Rocky Mountains? MtnClim, 2018, Rocky Mountain Biological Laboratory, Gothic, CO.

Apple, Martha. E. 2018. Plant Functional Traits Vary with Position on Periglacial Patterned Ground at Glacier National Park, Montana. Seminar, Department of Botany, University of Kashmir, Kashmir, India.

Apple, M.E., Ricketts, M.K., and Gallagher, J.H.R. 2017. Plant Functional Traits Are More Consistent Than Plant Species on Periglacial Patterned Ground in the Rocky Mountains of Montana. American Geophysical Union (AGU) Fall Meeting, New Orleans, LA.

Zhou, X., Zhou, Z., Apple, M.E., and Spangler, L. 2019. Composition and Structure of Microalgae Indicated in Raman and Hyperspectral Spectra and Scanning Electron Microscopy: from Cyanobacteria to Isolates from Coal-bed Methane Water Ponds. American Geophysical Union (AGU) Fall Meeting, New Orleans, LA.

Zhou, X., Zhou, Z., Apple, M. E. and Spangler, L. 2019. Quantification of Concentration of Microalgae *Anabaena cylindrica*, Coal-bed Methane Water Isolates *Nanochloropsis gaditana* and PW-95 in Aquatic Solutions through Hyperspectral Reflectance Measurement and Analytical Model Establishment. American Geophysical Union (AGU) Fall Meeting, New Orleans, LA.

Apple, M.E., Martin, A. C., and D. J. Moritz. 2013. Life on a Changing Edge: Arctic-Alpine Plants at the Edges of Permanent Snowfields that are Receding Due to Climate Change at Glacier National Park. American Geophysical Union Fall Meeting, San Francisco, CA.

Apple, M.E. 2013. Alpine Plants and Climate Change in Glacier National Park, New Zealand and Scotland. Montana Tech Public Lecture Series, Butte, Montana.

Apple, M.E. 2013. Life on a Changing Edge: Rare, Peripheral Arctic-Alpine Plants on the Edges of Permanent Snowfields/Glaciers that are Receding Due to Climate Change in Glacier National Park. Glacier National Park Science and History Day, West Glacier, Montana.

Apple, M.E. 2013. GLORIA, Plant Functional Traits, and Snowfields at Glacier National Park. GLORIA Mini Summit, West Glacier, Montana.

Apple, M.E. 2013. Snowfields, Plant Functional Traits, and GLORIA. Botany Seminar, University of Otago, Dunedin, New Zealand.

Apple, M., Rowe, J., Zhou, X., Jewell, S., Dobeck, L., Al Cunningham, A., and Spangler, L. 2012. Responses of Mycorrhizal Symbioses to Deliberate Leaks from an Experimental CO₂ Sequestration Field: The ZERT Site. American Geophysical Union Fall Meeting, San Francisco, CA.

Apple, M. E., Bengtson, L., Fagre, D., Millar, C. I., Westfall, R., and Dick, J. 2012. The Gloria Project and Functional Traits of Mountain Plants as Predictors of Their Responses to Climate Change. MtnClim Conference, Estes Park, Colorado.

Apple, M., Sharma, B., Zhou, X., Shaw, J., Dobeck., L., Cunningham, A., and Spangler, L. 2011. Plants as Indicators of Past and Present Zones of Upwelling Soil CO₂ at the Zero Emissions Research and Technology (ZERT) Facility. American Geophysical Union Fall Meeting, San Francisco, CA.

Sharma, B, Apple, M E, Morales, S, Zhou, X, Holben, B, Olson, J, Prince, J, Dobeck, L, Cunningham, A B, Spangler, L. 2010. Stomatal Conductance, Plant Species Distribution, and an Exploration of Rhizosphere Microbes and Mycorrhizae at a Deliberately Leaking Experimental Carbon Sequestration Field (ZERT). American Geophysical Union Fall Meeting, San Francisco, CA.

Apple, M E, Prince, J, Morales, S, Apple, C, Gallagher, J. 2010. Fine-scale Phenology and Nitrogen-Fixing Microbes at a GLORIA Site in Southwestern Montana, USA_{SEP}. American Geophysical Union Fall Meeting, San Francisco, CA.

Zhou, X, Lakkaraju, V R, Apple, M E, Dobeck, L, Cunningham, A B, Spangler, L. 2010. Changes of spectral and radiometric properties of vegetation and soil electric properties in response to simulated surface CO₂ leakage of geologically sequestered CO₂. American Geophysical Union Fall Meeting, San Francisco, CA.

Apple, M., Warden, J., Pullman, T., Apple, C., and J. Gallagher. 2010. Phenology at the Southwestern Montana GLORIA Site. Invited Talk, GLORIA Conference, Perth, Scotland, 2010

Apple, M., Warden, J. E., Pullman, T. Y., Prince, J. B., Apple, C. J., and J. H. Gallagher. 2010. Nitrogen-fixing microbes in a Global Research Initiative in Alpine Environments (GLORIA) site in Southwestern Montana, USA. Presented at the Global Change in Mountain Environments Conference, GLOCHAMORE, Perth, Scotland, 2010.

Male, E. J., Pickles, W. L., Silver, E. A., Hoffmann, G. D., Lewicki, J. L., Apple, M., Dobeck, L., Repasky, K., Burton, E. A. 2009. Monitoring Surface CO₂ Leaks Using Hyperspectral Plant Signatures During the 2008 and 2009 ZERT Shallow Subsurface CO₂ Release Experiment in Bozeman, MT. American Geophysical Union Annual Meeting, San Francisco.

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Funding

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Acquisition of a confocal microscope to enhance biological and materials research at Montana Tech. 2018. Katherine Zodrow, K. PI, Skinner, J., Apple, M. Co-PIs. NSF-MRI. \$364,383.

Proactive management models for the effects of climate change on the range expansion of invasive species. 2016. Pal, R., Shah, M., Project Directors and Apple, M. Battle, L. and Reshi, Z. Collaborators. Obama Singh Foundation. \$243,900.

Enhancing Montana's Energy Resources: Research in Support of the State of Montana Energy Policy Goals. 2015-17. Apple, M. PI for Objective 5 on Biofuels and Microbes from the Coal Bed Methane Ponds within MREDI. \$1,200,000.

Measuring Impacts to Rare Peripheral Arctic-Alpine Plants at the Edges of Permanent Snowfields/Glaciers that are Receding due to Climate Change in Glacier National. Apple, M. 2012-14. PR No. _R124212007. \$10,000.

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Environmental Responses to Carbon Mitigation through Geological Storage.

Cunningham, A. Spangler, L, Bromenshenk, J., Apple, M., Zhou, X. 2008-11.
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Curriculum Review Committee Agenda

4/22/24

11 a.m.

<https://us06web.zoom.us/j/83865298648>

Proposals:

	College	Program	Proposal	Vote
1	LCME	BS GeoEng	Reduction in Credits	Pass w/revision
2	LCME	UAS Certificate	Curriculum Revisions	Pass
3	LCME	BS/AAS CyberSecurity	Curriculum and Course Revisions	Pass
4	CLSPS	BS Nursing	Replace NRSG 425 with NRSG 410	Pass
5	CLSPS	BS Nursing	Update NRSG 450	Pass
6	CLSPS	BS Nursing	Curriculum Revision (Chemistry)	Pass
7	CLSPS	BSN Post License	Program Moratorium	Pass
8	LCME	BS EnvEng	Reduction in Credits	Pass
9	LCME	Freshman Eng	Updates for EGEN 100, 101, and 194	Pass
10	LCME	MS MatSciEng	Revise Capstone Requirement with MTSI 500	Pass
11	LCME	M&ME Minor	Curriculum Revisions	Pass
12	LCME	BS PetEng	Curriculum Revisions, add PET 430	Pass
13	LCME	BS PetEng	Update PET 402	Pass
14	LCME	MS IH Distance / Prof Track	Revise Admission Requirements	Pass
15	LCME	MS IH / IH Dist / Prof Track	Revise Course Numbers and Elective (IH 508)	Pass
16	LCME	MS Programs	Rename IH 524	Pass w/revisions
17	LCME	MS IH Distance / Prof Track	Change Program name to Industrial Hygiene Professional Track	Pass
18	LCME	BS MechEng	Curriculum and Course Revisions	Pass w/revisions
19	LCME	BS Construction Management	Curriculum Revision and Revised Capstone	Pass
20	LCME	BS Construction Management	Additional Sprint Paths (3 or 3.5 years)	Pass w/revisions

Officer Elections

Form Revisions

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

- 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

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 ___ March 28, 2024 ___

Dept. ___ Geological Engineering ___

Program B.S. Geological Engineering

College ___ LCME ___

CRC Representative ___ Mary MacLaughlin ___

Description of Request: Modification of curriculum, reducing from 130 credits to 120 credits

We propose to remove 19 credits from the required curriculum and reduce the field module requirement from 4 credits to 2 credits, and increase electives by 11 credits, maintaining the rigor in the program while providing for maximum flexibility for the students.

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

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
See attached (following signature page).			
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):

Previous and proposed curriculum comparisons and worksheets are attached (separate document)

Assessment Leading to Request

The dean of LCME asked all of the programs to evaluate their curricula and consider reducing the number of credits. The Geological Engineering faculty and IAB were very proud of the 136-credit curriculum and how well-prepared our graduates are, but we also understand that the high number of credits may be having a negative impact on the number of students who choose our program. The faculty and IAB discussed the idea that students who want to be better prepared can take more than the minimum. We dropped from 136 credits to 130 credits in spring 2023, and spent the 2023-24 academic year considering further credit reductions.

The Geological Engineering faculty and IAB Curriculum Subcommittee have thoroughly reviewed the BS Geological Engineering curriculum and developed plans for a curriculum with 120 credits. We scrutinized every single course. We reviewed ABET requirements as well as FE exam (and FG exam) topics. We discussed issues that students have had in the past that delayed their graduation, as well as future employability of our graduates. We discussed what is and is not attractive about our degree and how to make it more attractive. The GeoE IAB Curriculum Subcommittee discussed many ideas and provided significant input.

We believe that this curriculum preserves the core content that is required for all geological engineers (9 credits of math through differential equations, 7 credits of chemistry, 9 credits of physics, 14 credits of geology, 14 credits of geological engineering, and 16 credits of basic engineering for a total of 87 required credits) and at the same time provides significant flexibility for students to select optimum electives. We serve students in 5 different "options" (geophysics, geotechnical, hydro, mining, and petroleum) who have different career objectives and consequently are interested in slightly different sets of electives. We also serve a large number of transfer students and think that this new curriculum will facilitate their paths through our degree program. The recent adjustments of the math and physics prerequisites have helped a lot. We are excited to propose this new plan!

GEOE Curriculum changes

Anticipated Impacts to "Other" Programs

The removal of Geo 257 Sedimentology from our core curriculum gives us less incentive to find a faculty member who can teach this course, which may impact the Petroleum Engineering program. Similarly, we have removed the Gphy 284 Intro to GIS course because we currently don't have a faculty member to teach it, and this may have some impact on other programs (restoration, CET, etc). If we are able to hire a faculty member with GIS expertise, we may consider making this a required course again in the future. We have removed two Mining Engineering courses from the core but they are still required for one or more options, so there is a potential for a small decrease in enrollment. We have added Min 320 as an alternative to Stat 332 (potentially increasing enrollment in Min 320 and small decrease in Stat 332).

Impact on Library: No consultation with the library is required since changes involve slight adjustment to courses in the curriculum.

Date to take effect: ___Summer, 2024___

APPROVALS

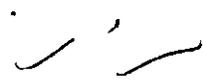
Department Head Approval

Date 04/17/2024

_____  _____

Dean Approval

Date 4/28/2024

_____  _____

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

GEOE Curriculum changes

Geological Engineering, B.S.

To achieve its objective, the Geological Engineering B.S. degree is founded upon a strong background in mathematics, physical and geological sciences, and engineering fundamentals; as well as communications skills and the humanities and social sciences - a background that will support future career success and continued pursuit of learning. During their junior and senior years, students are introduced to the fundamental areas of Geological Engineering taught at Montana Tech, including Hydrogeology, Mining Geology, Geotechnical Engineering, and Geophysics. Students are then required to select an area of emphasis (option) for completion of their degree, or to design a program of electives that better serves their personal interests and objectives in concert with their faculty advisor. Students are also encouraged to take electives that will prepare them for the Fundamentals of Engineering (FE) examination, as taking the FE exam is a requirement for the degree.

Required Core Courses: 87 credits

Math (9 credits): M 171 Calculus I, M 172 Calculus II, M 274 Introduction to Differential Equations

Chemistry (7 credits): CHMY 141 College Chemistry I, CHMY 142 College Chemistry Laboratory I, CHMY 143 College Chemistry II

Physics (9 credits): PHSX 234 General Physics - Mechanics, PHSX 235 General Physics - Heat, Sound & Optics, PHSX 235 General Physics – Electricity, Magnetism & Motion

Engineering (16 credits): EGEN 101 Introduction to Engineering Calculations & Problem Solving, EGEN 194 Freshman Engineering Seminar, EGEN 201 Engineering Mechanics - Statics, EGEN 305 Mechanics of Materials, EGEN 325 Engineering Economic Analysis, EGEN 335 Fluid Mechanics

Geology, Geological Engineering, & Geophysics (28 credits):

- Geo 101 Introduction to Physical Geology
- Geo 204 Introduction to Mineralogy/Petrology
- Geo 209 Introduction to Field Geology
- Geo 429 Field Geology (minimum 1 credit)
- GeoE 104 Introduction to Geological Engineering
- GeoE 403 Structural Geology for Engineers
- GeoE 410 Mining Geology
- GeoE 420 Hydrogeology for Engineers
- GeoE 440 Geological Engineering
- GeoE 488 FE Examination
- GeoE 499W Geological Engineering Design Project
- GeoE 429 Field Hydrogeology or GeoE 449 Field Geotechnical Engineering (minimum 1 credit)
- Geop 402 Introduction to Applied Geophysics

Communications (6 credits):

- WRIT 121 Introduction to Technical Writing (preferred) or WRIT 101
- WRIT 321W Advanced Technical Writing

Social Sciences (6 credits): 6 credits of courses as listed in the Montana Tech Course Catalog as approved for satisfying the General Education Requirements “Social Science Core”

Humanities (6 credits): 6 credits of courses as listed in the Montana Tech Course Catalog as approved for satisfying the General Education Requirements “Humanities & Fine Arts Core” (note: MUSI 108, 112, and 114 may be repeated for credit up to 3 credits)

All students majoring in the Geological Engineering B.S. program must meet the general core requirements of Montana Tech. Montana Tech’s General Education Core is satisfied by the above requirements.

GEOE Curriculum changes

Electives: 33 credits

Engineering Electives (15 credits minimum): 15 credits of electives must have engineering content. See list below for recommended courses and other allowable courses.

Professional Electives (15 credits minimum): 15 credits of electives that can include additional engineering electives, or allowable math/science and other professional courses. See list below for recommended courses and other allowable courses.

Free Electives (3 credits): any college-level course.

Other Constraints on Electives:

- One of the following electives that contains statistics content is required: Stat 332 Statistics for Scientists & Engineers (Professional Elective) or Min 320 Mining Data Analytics (Engineering Elective).
- A minimum of 1 credit is required from this list of Engineering Electives covering GeoMaterials laboratory content: ECIV 210 Construction Materials (3 credits), ECIV 487 Soil Mechanics Lab (1 credit), ETCC 210 Soil Materials & Testing (2 credits), GeoE 444 Rock Mechanics Lab (1 credit), Min 467 Geomechanics (3 credits), or Pet 205 Petroleum Engineering Lab I (1 credit).
- A minimum of 9 credits must be higher than 2xx-level.
- A minimum of 9 credits must be in Geo, GeoE, Geop, Gphy, Min, Pet, or UAS courses.
- A maximum of 9 credits total are allowed that fall into the categories of seminars (e.g. XXX 194, 294 or 494, or Min 300), internships (e.g. XXX 298 or 498), undergraduate research (e.g. XXX 490), independent study (e.g. XXX 492), introduction to the major courses (e.g. ECIV 102, MIN 105, MTSI 500, PET 201), practical/practicum studies (e.g. NRSM 495W, Min 140/240), and examination review courses (e.g. EGen 488 Fundamentals of Engineering Exam, ECIV 458 FE Review for Civil Engineers, EELE 486 FE Exam for EE, EENV 488 FE Review for Env Eng), or additional approved courses satisfying communications/humanities/social science general education requirements in excess of those satisfying the required core.
- No graduate thesis or dissertation research credits may be counted as undergraduate electives in the B.S. Geological Engineering degree.

Engineering Electives:

Recommended courses:

- Any courses listed as required for one of the established Geological Engineering B.S. degree options (except Geo 257, which is considered a “professional elective”).
- Any GEOE and GEOP courses that are not part of the required undergraduate curriculum.
- Any MIN or PET courses (except MIN 230, MIN 458, and PET 225 which are considered “professional electives,” and MIN 400 which is an approved “social science” elective)
- Courses to prepare for the FE exam (the “other disciplines” or “civil engineering” versions of the exam are the most popular among geological engineering students): ECIV 312 Structures I, ECIV 350 Transportation Engineering, ECIV 458 FE Review for Civil Engineers, ECIV 486 Soil Mechanics & Foundation Design, EELE 201 Circuits I, EGEN 202 Dynamics, EGEN 213 Survey of Met & Mat Eng, EGEN 324 Thermodynamics, EGEN 488 Fundamentals of Engineering Exam, MIN 305 Plant Design

Other allowed courses:

- ENGR 5500, 5710; ETCC 235, 236, 310; MPEM 5020; SRVY 230, 247, 255, 273; UAS 420
- Any classes (except graduate thesis or dissertation credits) in CSCI (except CSCI 101/102 which is an approved “social science” elective), DDSN, ECIV, EELE, EENV, EGEN, EMAT, EMEC, EMET, ENVE, EWLD, MTSI.

Professional Electives:

Recommended courses:

- Any courses in GEO that are not part of the required undergraduate curriculum.
- UAS courses (except 420, which is an “engineering” elective) and/or courses that will contribute to the UAS Certificate.
- Courses that will lead to a minor, as listed in the requirements for each minor program. In particular, M 405, 410, and/or 426 are recommended for those seeking a minor in mathematics.
- WRIT 350W Technical Editing.

Other allowed courses:

- Any CHMY or PHSX courses that are not part of the required undergraduate curriculum.
- Any M course numbered 151 or above, not required for the undergraduate curriculum.
- MIN 230 and 458; PET 225; SRVY 262 and 265; STAT 4xx or above.
- Any classes (except graduate thesis or dissertation credits) in ACTG, BGEN, BIOE, BIOH, BIOM, BIOO, BMGT, BMIS, BMKT, COMX, ECP, HONR, MART, MPEM (except 5020, which is considered an “engineering” elective), NRSM, OSH.

GEOE Curriculum changes Geological Engineering

Freshman

Fall Semester

- [CHMY 141 - College Chemistry I](#) 3 credits
- [CHMY 142 - College Chemistry Laboratory I](#) 1 credit
- [M 171 - Calculus I](#) 3 credits
- [EGEN 101 - Introduction Engineering Calculations & Problem Solving](#) 3 credits
- [EGEN 194 - Freshman Engineering Seminar](#) 1 credit
- [GEO 101 - Introduction to Physical Geology](#) 3 credits

Total: 14

Spring Semester

- [CHMY 143 - College Chemistry II](#) 3 credits
- [GEOE 104 - Introduction To Geological Engineering](#) 1 credit
- [M 172 - Calculus II](#) 3 credits
- [PHSX 234 - General Physics-Mechanics](#) 3 credits
- [Professional Elective \(*\)](#) 3 credits
- 1xx-level writing course: (WRIT 121 preferred)
[WRIT 121 - Introduction To Technical Writing](#) 3 credits 3 credits -OR- [WRIT 101 - College Writing I](#)

Total: 16

Sophomore

Fall Semester

- [GEO 209 - Introduction To Field Geology](#) 1 credit
- [EGEN 201 - Engineering Mechanics-Statics](#) 3 credits
- [M 274 - Introduction to Differential Equation](#) 3 credits
- [PHSX 235 - General Physics-Heat, Sound & Optics](#) 3 credits
- [Social Science Elective](#) 3 credits
- Free Elective 1 credit

Total: 14

Spring Semester

- [EGEN 305 - Mechanics of Materials \(equiv 205\)](#) 3 credits
- [EGEN 335 - Fluid Mechanics](#) 3 credits
- [GEO 204 - Introduction to Mineralogy-Petrology](#) 3 credits
- Professional Elective: [M 273 - Multivariable Calculus](#) 4 credits (co-requisite for Phsx 237)
- [PHSX 237 - General Physics-Electricity, Magnetism & Motion](#) 3 credits

Total: 16

GEOE Curriculum changes

Junior

Fall Semester

- [EGEN 325 - Engineering Economic Analysis](#) 3 credits
- [GEOE 420 - Hydrogeology For Engineers](#) 3 credits
- [GEOE 440 - Geological Engineering](#) 3 credits
- [GEOP 402 - Introduction to Applied Geophysics](#) 3 credits
- [Statistics elective:](#)
[STAT 332 Statistics for Scientists & Engineers \(Professional Elective\)](#) 3 credits
-OR -[MIN 320 – Mining Data Analytics \(Engineering Elective\)](#) 3 credits

Total: 15

Spring Semester

- [GEOE 403 - Structural Geology for Engineers](#) 3 credits
- [WRIT 321W - Advanced Technical Writing](#) 3 credits
- [Social Science Elective](#) 3 credits
- Free Elective 2 credits
- Engineering Elective: GeoMaterials course (*) 1-3 credits
- Engineering Elective (*) 0-2 credits

Total: 14

Senior

Field Modules

- [GEO 429 - Field Geology](#) 1-4 credits (1 credit minimum)
- [Field Camp with Engineering Focus: \(1 credit minimum\):](#)
[GEOE 429 - Field Hydrogeology](#) 1-4 cr - OR -[GEOE 449 - Field Geotechnical Engineering](#) 1-4 cr

Total: 2

Fall Semester

- [GEOE 499W - Geological Engineering Design Project](#) 3 credits
- [Humanities Elective](#) 3 credits
- Engineering Elective (*) 3 credits
- Engineering Elective (*) 3 credits
- Professional Elective (**) 3 credits

Total: 15

Spring Semester

- [GEOE 410 - Mining Geology](#) 3 credits
- [Humanities Elective](#) 3 credits
- Engineering Elective (*) 3 credits
- Professional Elective (**) 2 credits
- Engineering Elective (*) or Professional Elective (**) 3 credits

Total: 14

Minimum Credits for a B.S. degree in Geological Engineering: 120

See lists above for courses satisfying Engineering electives (*) and Professional electives (**).

Geological Engineering Options

Degree Option Requirements

Students are encouraged to select one of the following options within the Geological Engineering B.S. program and choose “Engineering electives” and “Professional electives” according to the listed courses. Completed option(s) are indicated on the student’s transcript. Students who do not select one of the approved options must design a set of electives that meets their educational objectives and have it approved by their Faculty Advisor and Department Head, ideally no later than the Spring Semester of their Junior Year.

Requirements for Geological Engineering Options:

Geophysics Option:

- Required courses (12 credits):
 - Geop 409
 - Geop 411
 - Geop 413
 - Geop 425 or 525
- Recommended courses: CSCI 117 Programming with MatLab, M 333 Linear Algebra, EELE 201 Circuits I, EELE 202 Circuits II, GeoE 585 GIS in Natural Resources, Gphy 284 Introduction to GIS, UAS courses, machine learning courses (e.g. CSCI 447 Machine Learning)

Geotechnical Option:

- Required courses (15 credits):
 - GeoE 541 Advanced Engineering Geology
 - GeoE 542 Slope Stability Analysis & Design
 - GeoE 548 Geotechnical Modeling
 - Soil Mechanics (e.g. ECIV 486 Soil Mechanics & Foundation Design)
 - Surveying (e.g. Min 210 Plane Surveying or SRVY 230 Introduction to Surveying for Engineers)
- Recommended courses: CSCI 102 Computational Thinking w/Lab (Social Science Elective), EGen 202 Dynamics and/or EGen 324 Thermodynamics (for FE exam), GeoE 449 Field Geotechnical Engineering, GeoE 444 Rock Mechanics Lab, GeoE 406 Geomorphology, GeoE 585 GIS in Natural Resources, Gphy 284 Introduction to GIS, Min 475/575 Tunneling & Underground Construction, Soil Mechanics Lab (e.g. ECIV 487), Programming (e.g. CSCI 116 Intro to Python Programming), CAD courses, UAS courses

Hydrogeology Option:

- Required courses (9 credits):
 - GeoE 422 Groundwater Flow Modeling
 - EENV 403 Surface Water Hydrology or EENV 430 Soil/Subsurface Remediation
 - GeoE 520 Advanced Hydrogeology or GeoE 528 Contaminant Transport or GeoE 533 Hydrogeochemistry or Chem 442 Environmental Chemistry
- Recommended courses: GeoE 429 Field Hydrogeology, EGen 324 Thermodynamics (for FE exam), Geo 257 Sedimentology and Petroleum Geology, Gphy 284 Introduction to GIS

GEOE Curriculum changes

Mining Option:

- Required courses (18 credits):
 - EMET 232/234 Process Engineering Fundamentals plus Lab
 - Min 105 Introduction to Mining
 - Min 210 Plane Surveying
 - Min 467 Geomechanics
 - 6 additional credits of Min courses
- Recommended courses: EGen 202 Dynamics, EGen 324 Thermodynamics, Min 400 Economics of the Mineral Industries (social science elective), Min 320 Mining Data Analytics (statistics elective), Min 205 Mining & Construction Equipment, Min 216/217 Mine Surveying & Data Analysis 1 & 2, Min 305 Plant Design (for FE exam), Min 408 Valuation of Mineral Properties, Min 411 Advanced Mining Method Selection, Min 412/413 Applied Mine Design 1 & 2, Min 425 Rock Fragmentation, Min 475/575 Tunneling & Underground Construction

Petroleum Option:

- Required courses (16 credits):
 - Geo 257 Sedimentology & Petroleum Geology
 - Pet 201 Elements of Petroleum Engineering
 - Pet 205 Petroleum Engineering Lab 1
 - Pet 301 Intro to Well Drilling
 - Pet 304 Rock Properties
 - Pet 348 Petroleum Well Logging
- Recommended courses: Geo 259 Sedimentology/Stratigraphy Lab, Pet 225 Presentation & Professionalism, Pet 372 Petroleum Fluids & Thermodynamics, EGEN 324 Thermodynamics, any other Pet course 3xx-level or above

BS Geological Engineering Curriculum Comparison (old=130 cr, new=120 cr)

Summary: Old Curriculum (2023-24)

REQUIRED CORE:	108 Credits		ELECTIVES:	22 Credits
Gen Ed	18	6 Communications 6 Humanities 6 Social Sciences	15 GeoE & Technical Electives 6 FE Electives 1 Free Elective	Topics on FE exam, to support passing the exam (had been 9 credits previously.)
Math	16	3 M 171 Calculus 1 3 M 172 Calculus 2 4 M 273 Calc 3 3 M 274 Differential Equations 3 Stat 332 Statistics for Engineers	Not required for degree but still required as a co-req for Physics 237, so most students will take this as an elective. One statistics course will be required (Stat 332 or Min 320)	
Chemistry	7	3 Chem 141 Chemistry 1 1 Chem 142 Chem Lab 3 Chem 143 Chemistry 2		
Physics	9	3 Physics 234 Mechanics 3 Physics 235 Heat, Sound, Optics 3 Physics 237 Electricity, Magnetism	(co-req calc 3) (co-req calc 3)	This co-req is being dropped.
Geology/GIS	15	3 Geo 101 Physical Geology 1 Geo 209 Intro to Field Geology 3 Geo 204 Mineralogy/Petrology 3 Geo 257 Sedimentology 2 Geo 429 Field Geology 3 GRHV 284 Intro to GIS	No faculty to teach this right now. Will be an elective. Dropping to 1 credit required. No faculty to teach this right now. Will be an elective.	
Geological Eng	21	1 GeoE 104 Intro to GeoE 3 GeoE 403 Structural Geology for Engineers 3 GeoE 410 Mining Geology 3 GeoE 420 Hydrogeology for Engineers 3 GeoE 440 Geological Engineering 2 GeoE 429/449 Hydro or Geotech field camp 3 GeoE 499W Geological Engineering Design Project 3 Geop 402 Applied Geophysics	Will no longer be considered 3 engineering credits. Will no longer be considered 3 engineering credits. Dropping to 1 credit required. Will no longer be considered 3 engineering credits.	
Engineering	22	3 EGen 101 Introduction to Engineering Calculations & Problem Solving 1 EGen 194 Freshman Engineering Seminar 3 EGen 201 Statics 3 EGen 305 Mechanics of Materials 3 EGen 325 Engineering Econ 3 EGen 335 Fluid Mechanics 3 Min 210 Surveying 3 Min 467 Geomechanics	Elective, required for mining and geotech options. Elective, required for mining option, 1 credit minimum of rock/soil/geomech will be required.	
Total Gen Ed	18			
Total Math/Science	47			
Total Engineering	43			
TOTAL REQUIRED	108			

Summary: Proposed Curriculum (2024-25)

REQUIRED CORE:	87 Credits	(decrease of 21 credits from old curriculum)	ELECTIVES:	33 Credits	(increase of 11 credits)
Gen Ed	18	6 Communications 6 Humanities 6 Social Sciences	15 Engineering Electives 15 Professional Electives 3 Free Electives	(From a list, possibly two lists: recommended and other allowable) (additional engineering electives, plus math (and stat), science incl GPHY, UAS) (any college-level course)	
Math	9	3 M 171 Calculus 1 3 M 172 Calculus 2 3 M 274 Differential Equations	3 Statistics Elective: Stat 332 (Professional Elective) or Min 320 (Engineering Elective)		
Chemistry	7	3 Chem 141 Chemistry 1 1 Chem 142 Chem Lab 3 Chem 143 Chemistry 2	1 minimum GeoMaterials Engineering Lab/Course (Engineering Elective) New rock mech lab course, Pet 205 Pet Eng Lab 1, ECIV 487 Soil Mech Lab (all of these are 1 credit) ETCC 210 (2 cr), ECIV 210 (3 cr), Min 467 Geomech (3 cr)		
Physics	9	3 Physics 234 Mechanics 3 Physics 235 Heat, Sound, Optics 3 Physics 237 Electricity, Magnetism	(co-req calc 3)	9 minimum Higher than 2xx-level 9 minimum Geo, GeoE, Geop, Gphy, Min, or Pet, UAS	
Geology	14	3 Geo 101 Physical Geology 1 Geo 209 Intro to Field Geology 3 Geo 204 Mineralogy/Petrology 2 GeoE 403 Structural Geology for Engineers 2 GeoE 410 Mining Geology 1 Geo 429 Field Geology 2 Geop 402 Applied Geophysics	9 maximum Seminar, Internship, "Practical," FE Review, and "Intro to the major" credits Undergraduate research, independent study (No graduate thesis or dissertation research credits can be counted as undergraduate electives)		
Geological Eng	14	1 GeoE 104 Intro to GeoE 1 GeoE 403 Structural Geology for Engineers 1 GeoE 410 Mining Geology 3 GeoE 420 Hydrogeology for Engineers 3 GeoE 440 Geological Engineering 1 GeoE 429/449 Field camp with engineering component 3 GeoE 499W Geological Engineering Design Project 1 Geop 402 Applied Geophysics			
Engineering	16	3 EGen 101 Introduction to Engineering Calculations & Problem Solving 1 EGen 194 Freshman Engineering Seminar 3 EGen 201 Statics 3 EGen 305 Mechanics of Materials 3 EGen 325 Engineering Econ 3 EGen 335 Fluid Mechanics			
Total Gen Ed	18				
Total Math/Science	39				
Total Engineering	30				
TOTAL REQUIRED	87				
Electives	33				

BS Geological Engineering: OLD curriculum (130 cr, adjusted courses in yellow)

Curriculum Sheet for Geological Engineering

Geological Engineering
2023/2024

Student Name _____

Course Course

Number	Title	# Credits	Science	Engineering	Hum/Soc		Notes
					Sci/Comm	Electives	
CHMY 141	College Chemistry I	3	3				
CHMY 142	College Chemistry Lab I	1	1				
EGEN 101	Intro to Eng Calc & Problem Solv	3		3			
EGEN 194	EGEN Seminar	1		1			
M 171	Calculus I	3	3				
GEO 101	Introduction to Physical Geology	3	3				
CHMY 143	College Chemistry II	3	3				
GEOE 104	Intro to Geological Engineering	1		1			
GPHY 284	Intro to GIS Science Cartography	3	3				
M 172	Calculus II	3	3				
PHSX 234	Gen Phys - Mechanics	3	3				
WRIT 121/101	Intro to Writing - 121 preferred	3			3		
GEO 209	Intro to Field Geology	1	1				
EGEN 201	Statics	3		3			
GEO 257	Sedimentology & Pet Geology	3	3				
M 273	Multivariable Calculus	4	4				
PHSX 235	Gen Phys - Heat, Sound & Optics	3	3				
	Free Elective	1				1	
ECNS 203^	Prin of Micro and Macro (preferred)^	3			3		
EGEN 305	Mechanics of Materials	3		3			
GEO 204	Intro to Mineralogy-Petrology W/Lab	3	3				
M 274	Introduction to Differential Equations	3	3				
PHSX 237	Gen Phys - Elec, Magn & Motion	3	3				
	Social Science Elective	3			3		
EGEN 325	Engineering Economic Analysis	3		3			
GEOE 420	Hydrogeology for Engineers	3		3			
GEOE 440	Geological Engineering	3		3			
GEOP 402	Intro to Applied Geophysics	3	2	1			
STAT 332	Statistics for Scientists & Engineers	3	3				
EGEN 335	Fluid Mechanics	3		3			
GEOE 403	Structural Geology for Engineers	3	2	1			
MIN 467	Geomechanics	3		3			Require for mining option
WRIT 321	Advanced Technical Writing	3			3		
	F.E. Elective*	3				3	
	F.E. Elective*	3				3	
Field Modules	Geo 429 (req) plus GeoE 429 or 449	4	4				Reduce to 2 credits
MIN 210	Plane Surveying	3		3			Req for mining, geotech opt
GEOE 499W	Geological Engineering Design Proj	3		3			
	GEOE & Tech Elect. 3	3				3	
	GEOE & Tech Elect. 3	3				3	
	Humanities Elective	3			3		
GEOE 410	Mining Geology	3	2	1			
	GEOE & Tech Elect. 3	3				3	
	GEOE & Tech Elect. 3	3				3	
	GEOE & Tech Elect. 3	3				3	
	Humanities Elective	3			3		
Total credits for graduation:		130	55	35	18	22	

Need 30 Need 45 Gen Ed requirement

^ 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.

BS Geological Engineering: tentative PROPOSED curriculum (120 cr)

Curriculum Sheet for Geological Engineering

Geological Engineering
2024/2025

Student Name _____

Course	Course	# Credits	Science	Engineering	Hum/Soc Sci/Comm	Engineering Electives	Professional & Free Electives	Notes
CHMY 141	College Chemistry I	3	3					
CHMY 142	College Chemistry Lab I	1	1					
EGEN 101	Intro to Eng Calc & Problem Solv	3		3				
EGEN 194	EGEN Seminar	1		1				
M 171	Calculus I	3	3					
GEO 101	Introduction to Physical Geology	3	3					
CHMY 143	College Chemistry II	3	3					
GEOE 104	Intro to Geological Engineering	1		1				
M 172	Calculus II	3	3					
PHSX 234	Gen Phys - Mechanics	3	3					
WRIT 121/101	Intro to Writing - 121 preferred	3			3			
	Professional Elective	3					3	
GEO 209	Intro to Field Geology	1	1					
EGEN 201	Statics	3		3				
M 274	Introduction to Differential Equations	3	3					
PHSX 235	Gen Phys - Heat, Sound & Optics	3	3					
	Social Science Elective	3			3			
	Free Elective	1					1	
EGEN 305	Mechanics of Materials	3		3				
EGEN 335	Fluid Mechanics	3		3				
GEO 204	Intro to Mineralogy-Petrology W/Lab	3	3					
M 274	Professional Elective: Multivariable Calculus	4					4	
PHSX 237	Gen Phys - Elec, Magn & Motion	3	3					
GEOE 420	Hydrogeology for Engineers	3		3				
GEOE 440	Geological Engineering	3		3				
GEOP 402	Intro to Applied Geophysics	3	2	1				
STAT 332 or Min 320	Professional or Engineering Elective: statistics	3	0	0		(0 or 3)	(0 or 3)	
EGEN 325	Engineering Economics	3		3				
GEOE 403	Structural Geology for Engineers	3	2	1				
WRIT 321	Advanced Technical Writing	3			3			
	Eng Elective: GeoMaterials Eng Lab/Course	1		0		1 (or 3)		
	Engineering Elective	2				2 (or 0)		
	Social Science Elective	3			3			
	Free Elective	2					2	
Field Modules	Geo 429 Field Geology	1	1					
	GeoE 429 or 449 Field Hydro or Field Geotech	1		1				
GEOE 499W	Geological Engineering Design Proj	3		3				
	Engineering Elective	3				3		
	Engineering Elective	3				3		
	Professional Elective	3					3	
	Humanities Elective	3			3			
GEOE 410	Mining Geology	3	2	1				
	Engineering Elective	3				3		
	Professional Elective	2					2	
	Professional or Engineering Elective	3				(0 or 3)	(0 or 3)	
	Humanities Elective	3			3			
GEOE 488	FE Exam Requirement Completed	0						
Total credits for graduation:		120	39	30	18	15	18	

Required: 87 ABET: need 4 Gen Ed requirement **120 credits total including 33 elective credits**
 Electives: 33 **15 credits of** electives must have engineering co

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 fewer.
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 April 18, 2024
Dept. Geological Engineering College LCME
Program (Undergraduate) UAS Certificate CRC Representative M. MacLaughlin
(applications & design)
Description of Request: Slight adjustments to 15-credit certificate (mostly adding electives)

Current Course or Program Information: 15-credit certificate

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
See accompanying document for adjustments to the program.			
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):

Previous curriculum summary/worksheet is attached, with changes indicated by blue highlighter.

Assessment Leading to Request

Multiple meetings and conversations with faculty and students regarding allowing additional courses to serve as electives to attract more students from a variety of majors. Also, we realized that clarification about the number of allowed seminar and capstone credits was warranted.

Anticipated Impacts to “Other” Programs

We are adding additional electives hoping that it will be easier for students from a variety of majors to complete the UAS certificate along with their degree.

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.)

No consultation with the library is required since changes involve slight adjustment to courses in the curriculum

Date to take effect (note that the earliest date is the next calendar year): Summer, 2024

APPROVALS

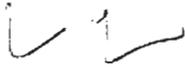
Department Head Approval

Date 4/18/2024

 _____

Dean Approval

Date 4/17/2024

 _____

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Certificate: Unmanned Aerial Systems (UAS) Applications & Design

This is a 15-credit certificate targeting students in undergraduate degree programs, but is also available to graduate students (note that some of the electives are at the 3xx level or below and consequently can not be part of a student's graduate program).

The curriculum is summarized in the following table. (new courses highlighted in yellow)

Course #	Course Title	# UAS Credits
REQUIRED CORE 6 credits <i>minimum</i>		6-9
UAS 401	UAV Regulations, Flight Planning, & Data Collection	(1)
UAS 402	Basic Flight Lab	(1)
GeoE 481	Basic Photogrammetric Modeling	(1)
UAS 494	UAS Seminar (1 credit/semester) (minimum 2, maximum 3)*	
*At least one seminar credit must be UAS 494 or UAS 594. Other seminar courses with documented UAS content (e.g. NRSM 494/594 or ENGR 5940) may be substituted for the additional seminar credit(s).		
UAS 499	UAS Capstone** (minimum 1, maximum 3)	
**Capstone requirement can also be satisfied (with UAS department head approval) by an alternative course containing documented requirement of an individual drone project and report, for instance:		
XXX 499W	Senior design or senior thesis course in the major	
XXX 490	Undergraduate research in the major	
ELECTIVES Select a sufficient number of electives for a total of 15 UAS credits:		
<i>Electives with full number of course credits counting toward the UAS certificate:</i>		
UAS 420	UAS Components & Design	(3)
UAS 502	Advanced Flight Lab	(1)
EELE 421	Feedback and Control II	(3)
GeoE 581	Advanced Photogrammetric Modeling	(1-3)
GeoE 585	GIS in Natural Resources	(3)
Geop 425 or 525	Remote Sensing for the Earth Sciences or Advanced Remote Sensing	(3)
Gphy 284	Intro to GIS Science Cartography	(3)
Min 216	Mine Surveying & Data Analysis 1	(1)
Min 217	Mine Surveying & Data Analysis 2	(1)
Srvy 247	Survey-Grade GPS Control Analysis	(3)
basic circuits	e.g. EELE 101, 201, 202, and/or 203	(maximum 4)
programming/CS	any 1xx-level CSCI course (except CSCI 194)	(maximum 3)
CAD/Civil3D	e.g. DDSN 114, 245, 246; ECIV 110, 215; EGEN 318; EMEC 215	(maximum 3)
XXX 491/591	Special Topics (should have "UAS" in the title)	(varies)

Electives w/partial UAS-related content, with 1 credit counting toward the UAS certificate:

EELE 317	Electronics (4 credits total with lab)	(1)
EELE 321	Intro to Feedback Controls (3 credits)	(1)
EENV 402/502	Surface Water Hydrology (3 credits)	(1)
EENV 404/504	Surface Water Quality (3 credits)	(1)
EENV 414/514	Land and Stream Restoration (3 credits)	(1)
GeoE 449	Field Geotechnical Engineering w/UAS (1-4 cr)	(1)
NRSM 435/535	Restoration I (3 credits)	(1)
NRSM 436/536	Restoration II (3 credits)	(1)

Other electives to be added as they become available

~~***Note: some courses with partial UAS content have fewer "UAS credits" than total credits~~

Total Credits	Required Core + Electives	15 minimum
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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 1 (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 fewer.
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 3/28/2024

Dept. Computer Science

College LCME

Program BS Cybersecurity and Network Systems Administration, AAS Computer Science

CRC Representative Melissa Holmes

Description of Request: _____

Replace the specialty internship class in the ITS program ITS 498 with the CSCI 498/494 Internship/Seminar option, take two courses that have been taught as ITS 391 and give them their own numbers

Current Course or Program Information: _____

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
	Replace ITS 391 with ITS 245 Introduction to Forensics	3	
	This course replaces ITS 355 Telephony to keep our program up to date. It is currently being taught as ITS 391 and students need to do a course substitution. We propose to use ITS 245 for this new course per the common course numbering to the curriculums of both programs in lieu of Telephony		
	Catalog description: ITS 245 Introduction to Forensics (3) This course focuses on the use of the most popular forensics tools and provides specific guidance on dealing with civil and criminal matters relating to the law and technology. Includes discussions on how to manage a digital forensics operation in today's business environment.		
	Replace ITS 391 with ITS 356 Cyber Defense in Action.	4	
	This course replaces ITS 366: CCNP Tshoot, It covers many of the same topics, and is updated, while not requiring a faculty certified by Cisco to teach CCNP level courses. Currently it is being taught as ITS 391 (different section) and course substitutions are done.		
	Catalog description: ITS 356 Cyber Defense in Action (4) This course is a continuation of ITS 274 Ethical hacking and explores offensive and defensive strategies related to Cyber Security. The students will work in teams to develop strategies for handling Cyber Security events and learn the importance of security policies, standards, and communications.		
	CSCI 498/CSCI 494 replacing ITS 489 Intership. This takes advantage of a similar course being taught for CS and SE majors and allows students in each group to learn from each other while conserving faculty resources.		
	CSCI 135 Fundamentals of Computer Science 1 replacing CSCI 116 Python (same change made in the CS and SE Programs a few years back.		

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

The assessment leading to the request was the need to keep the cybersecurity program current and replace Telephony with a more current course. There is also the concern of being able to find enough faculty with the CCNP certs to ensure that all classes with the CCNP designation could be taught. The use of the CSCI Internship or Seminar class allows us to conserve resources and provide a better experience for all the students.

Anticipated Impacts to "Other" Programs

None

Impact on Library: Nor required _____ 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): _____

MontanaTech

Curriculum Change Request Form Dated December 23, 2022

APPROVALS

Department Head Approval

Date 4/18/24



Dean Approval

Date 4/17/2024



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Intro to Forensics

ITS 245

Instructor: Jim Freebourn
Office: Rm 124A South Campus
Office Hours:

MTWTH 10:00 AM – 12:00PM
F 9AM – 10AM

Phone: 406-496-3771
E-Mail: jfreebourn1@mtech.edu
Classroom: Rm 124
Class Times: T H 4PM – 5:20PM

Prerequisites:

Textbook: Bill Nelson, Amelia Phillips, Christopher Steuart, *Guide to Computer Forensics and Investigations Sixth Edition*. Cengage Learning, 2018, ISBN-13: 978-1-337-56894-4.

Course Objectives

This course focuses on the use of the most popular forensics tools and provides specific guidance on dealing with civil and criminal matters relating to the law and technology. Includes discussions on how to manage a digital forensics operation in today's business environment.

Specific topic coverage includes:

- Understanding the Digital Forensics Profession and Investigations
- The Investigator's Office and Laboratory
- Data Acquisition
- Processing Crime and Incident Scenes
- Working with Windows and CLI Systems
- Current Digital Forensics Tools
- Linux and Macintosh File Systems
- Recovering Graphics Files
- Digital Forensics Analysis and Validation
- Virtual Machine Forensics, Live Acquisitions, and Network Forensics
- Email and Social Media
- Mobile Device Forensics
- Cloud Forensics
- Report Writing for High Tech Investigations
- Expert Testimony in High Tech Investigations
- Ethics for the Investigator and Expert Witness

Web Site

Supplementary information for the course is available at

https://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20b&product_isbn_issn=9781337568944&token=&_gl=1*|hk3xef*_ga*NzU3MTE0MTMlLjE2MzY2MTc2OTU.*_ga_1Z1VMVSHXM*MTcwNDMwNDc3NS4zNS4xLjE3MDQzMDUxMzAuMC4wLjA

The Web site contains class notes, PowerPoint slides, class announcements, the course syllabus, test dates, and other information for the course.

Grading and Evaluation Criteria

Exams/Labs/Homework		Grading		
Exam I	100	Grade	From	TO
Exam II	100	A	95%	100%
Labs/Quizzes	200	A-	90%	94%
Project	100	B+	86%	89%
Total Points	500	B	84%	86%
** Homework must be turned in no later than the due date and Exams/Quizzes must be taken at the announced time. There will be no make-up exams without prior arrangements. Syllabus subject to change at instructor's discretion.		B-	80%	83%
		C+	77%	79%
		C	74%	76%
		C-	70%	73%
		D	60%	69%
		F	Below	59%

Academic Dishonesty: Each student is responsible for their own work. Any student caught cheating will receive a failing grade and will be reported to the Dean.

Computer Lab Policy: Food and drink are not allowed in the computer labs. Please abide by this RULE.

Important Dates: Last Day to Write a Challenge Exam (15th Day of Classes)
Last Day to Withdraw From a Class Without Class Appearing on Transcript (15th Day of Class) Last Day for Faculty Input of Midterm Grades via Orediggerweb (40th Day of Class) Monday, Last Day to Drop a Class with an Automatic "W" (50th Day of Class)

15-Week Course Outline

Week	Topics	Chapter Readings	Exams
1	Understanding the Digital Forensics Profession and Investigations	Chapter 1	
2	The Investigator's Office and Laboratory	Chapter 2	
3	Data Acquisition	Chapter 3	
4	Processing Crime and Incident Scenes	Chapter 4	
5	Working with Windows and CLI Systems	Chapter 5	
6	Current Digital Forensics Tools	Chapter 6	
7	Linux and Macintosh File Systems	Chapter 7	Midterm Exam
8	Recovering Graphics Files	Chapter 8	
9	Digital Forensics Analysis and Validation	Chapter 9	
10	Virtual Machine Forensics, Live Acquisitions, and Network Forensics	Chapter 10	
11	Email and Social Media Mobil Device Forensics	Chapter 11 Chapter 12	
12	Cloud Forensics	Chapter 13	
13	Report Writing for High Tech Investigations Expert Testimony in High Tech Investigations	Chapter 14 Chapter 15	
14	Ethics for the Investigator and Expert Witness	Chapter 16	
15	Final Exam		

Cyber Defense in Action
ITS 356

Instructor:	Jim Freebourn	Phone:	496-3771
E-mail:	jfreebourn@mtech.edu	Office Hours:	MTWTH 10:00 AM – 12:00PM F 9AM – 10AM
Credit Hours:	4	Classroom:	HC Rm. 124
Class Times:	T TH 2:00 PM- 3:40 PM		

Textbooks:

CEH v11 Certified Ethical Hacker Study Guide
Ric Messier
ISBN: 978-1-119-80028-6
ISBN: 978-1-119-80030-9

Cybersecurity Attacks – Red Team Strategies
Publication date: March 2020
Publisher: Packt
ISBN: 9781838828868

Mastering Python for Networking and Security - Second Edition
Publication date: January 2021
Publisher: Packt
ISBN: 9781839217166

Red Team Field Manual (RTFM)

Course Objectives:

This course is a continuation of ITS 274 Ethical hacking and explores offensive and defensive strategies related to Cyber Security. The students will work in teams to develop strategies for handling Cyber Security events and learn the importance of security policies, standards, and communications.

It includes an in-depth understanding of how to effectively protect computer networks. Students will learn the tools and penetration testing methodologies used by ethical hackers. In addition, the course provides a thorough discussion of what and who an ethical hacker is and how important they are in protecting corporate and government data from cyber attacks. Students will learn updated computer security resources that describe new vulnerabilities and innovative methods to protect networks. Also covered is a thorough update of federal and state computer crime laws, as well as changes in penalties for illegal computer hacking. Students will learn how to use programming languages to develop security tools for detecting security weaknesses in computers and computers networks.

Special topic coverage includes:

- Ethical Hacking Overview
- TCP/IP Concepts Review
- Network and Computer Attacks
- Foot printing and Social Engineering
- Port Scanning
- Enumeration
- Programming for Security Professionals
- Desktop and Server OIS Vulnerabilities
- Embedded Operating Systems
- Hacking Web Servers
- Hacking Wireless Networks
- Cryptography
- Network Protection Systems
- Programming in Python

FLOC Learning Outcomes:

- Students will learn the mindset of a hacker allowing them to better understand the routes and methods used to penetrate to computer system or network.
- Computer network protocols will be reinforced to ensure students understand how hackers exploit vulnerabilities.
- Students will be expected to develop custom tools and utilize existing security tools to identify security weakness.
- The class will provide the students with the knowledge to identify specific weaknesses in operating systems and how to exploit the weaknesses.
- Students will develop the skills to conduct Reconnaissance, Gaining Access, Enumeration and Maintain Access to systems.
- Students will be able to identify threats and determine the source of the threat
- Students will develop reports and diagrams to effectively communicate threats and security weaknesses to management
- Use security tools to identify potentials vulnerabilities
- Capture network packets and identifies patterns that may suggest specific threats
- Review operating systems accessibility and ensure account enumeration is blocked
- Identify social engineering threats.
- Use Linux Cali to better understand penetration testing and how exploits are delivered.

Prerequisites: CCNA1
ITS 224 Linux
ITS 212 Windows Operating Systems

Grading and Evaluation Criteria

Exams/Labs/Homework		Grading		
Project I	100	Grade	From	TO
Project II	100	A	95%	100%
Lab / Quizzes	200	A-	90%	94%
Final Group Project	100	B+	87%	89%
Total Points	500	B	84%	86%
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Last Day for Faculty Input of Midterm Grades via Oredigger web (40th Day of Class) Monday, Last Day to Drop a Class with an Automatic "W" (50th Day of Class)

Classroom Civility:

1. Civility in the classroom and respect for the opinions of others is very important in an academic environment. It is likely you may not agree with everything which is said or discussed in the classroom. Courteous behavior and responses are expected.

To create and preserve a classroom atmosphere that optimizes teaching and learning, all participants share a responsibility in creating a civil and non-disruptive forum. Students are expected to conduct themselves at all times in this classroom in a manner that does not disrupt teaching or learning.

- You are expected to be on time. Class starts promptly at x. You should be in your seat and ready to begin class at this time. Class ends at x. Packing up your things early is disruptive to others around you and to myself.
- Classroom participation is a part of your grade in this course. To participate you must attend class having prepared the materials for the day. Questions and comments must be relevant to the topic at hand.
- Raise your hand to be recognized.
- Classroom discussion should be civilized and respectful to everyone and relevant to the topic we are discussing. Classroom discussion is meant to allow us to hear a variety of viewpoints. This can only happen if we respect each other and our differences.
- Any discussion from class that continues on any listserv or class discussion list should adhere to these same rules and expectations.
- Electronic devices such as cell phones and pagers must be turned off during class, unless you have informed me ahead of time that you are expecting an emergency message.

3. The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goals of academic freedom are maintained. Differences of viewpoint or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop an understanding of the community in which they live.

Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class.

4. Any successful learning experience requires mutual respect on the part of the student and the instructor. Neither instructor nor student should be subject to others' behavior that is rude, disruptive, intimidating, or demeaning. The instructor has primary responsibility for and control over classroom behavior and maintenance of academic integrity.

From the Center for Teaching Excellence at the University of California, Santa Cruz
(<http://teaching.ucsc.edu/tips.html#cte>)

Class List

Name:

I.D.

AAS Computer Networks & Cybersecurity				
Course No.	Course Title	Credits	Completed	Transfer/ Substitute
WRIT121 OR WRIT101	Intro. Tech. Writing College Writing I	3		
M121 OR M105	College Algebra Contemporary Math	3		
CSCI102 OR Soc. Science Elec.	Computational Thinking w/lab	3		
COMX230 OR COMX111	Pres. Tech. Info. OR Princ. Of Speaking	3		
ITS210	NOS – Desktop	3		
ITS130	Cybersecurity Essentials	3		
NTS104	CCNA 1	4		
ITS220	Wireless LANs	3		
ITS218	Network Security Fundamentals	3		
ITS280	Comp. Repair & Maintenance	3		
NTS105	CCNA 2	4		
XXXX	Web Elective	3		
ITS274	Ethical Hacking & Network Defense	3		
CSCI146 CSCI 135	Intro. to Python Fundamentals of Computer Science I	3		
ITS212	NOS – Server Administration	3		
NTS204	CCNA 3	3		
CAPP270	Oracle	3		
ITS214	NOS – Infrastructure	3		
ITS224	Intro to Linux	3		
ITS245	Proposed Class: ITS 245Intro to Forensics Legacy Class: ITS 355Telephony *Change ITS 391 to ITS 245	3 3		CR C Catalog Add/Change
	Total Credits	62		

BS Cybersecurity & Network Administration

Course No.	Course Title	Credits	Completed	Transfer/ Substitute
ITS362	CCNP: Routing	4		Current
ITS316	NOS – Directory Services	3		
STAT216	Intro. To Statistics	3		
ITS357	NOS – Virtualization	3		
XXX	Humanities Elective	3		
ITS318	Network Security	3		
CSCI210	Web Programming	3		
ITS 498	Proposed Class: CSCI498/CSCI 494 Internship/Seminar Legacy Class: ITS 498 Internship	3		CR Catalog Add/Change
XXXX	Physical or Life Science	3		
PHL325W	Professional Ethics	3		
ITS354	Advanced Linux	3		
ITS364	CCNP: Switching	4		
XXX	SS Elective	3		
XXXX	Physical or Life Science w/lab	3-4		
ITS365	Proposed Class: ITS 391: Cyber Defense in Action Legacy Class: CCNP: TShoo ITS 391 to ITS 365	4 4 6		CR Catalog Add/Change
ITS305	Web Server Administration	3		
ITS301	Information Storage Management	3		
ITS499W	Network Technology Capstone	4		
	Total Credits	120		

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 fewer.
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:

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- Re-titling an existing postsecondary educational program. Required Documents:
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- 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 March 26, 2024

Dept. Nursing

Program Nursing

College CLSPS

CRC Representative Laurie Noel/Charie Faught

Description of Request: _____

Replace NRSG 425 with New Course NRSG 410

Current Course or Program Information: _____

see below

Number (Assigned By CRC): _____

Proposed Change

<u>Course #</u>	<u>Name</u>	<u>Credits</u>	<u>Pre-req.</u>
	Remove NRSG 425 Concepts in Family Nursing	3 Credits,	Pre-req- Successful completion of BSN nursing semester four, five and six
	Add NRSG 410 (Blended) U.S. Health Systems: Policy, Economics, and Advocacy		Pre-req-Successful completion of BSN nursing semester four, five and six
	Course Description: The purpose of this course is to allow students to critically analyze U.S. health systems and social justice. Students will evaluate U.S. health policy and economics in order to deliver equitable care. This course provides students the opportunity to integrate advocacy skills in influencing policy or formulating strategies to advance patient care.		
	Course Outcomes: Upon completion of the course, the student will use the concepts of clinical judgment; communication; compassionate care; diversity, equity, and inclusion; ethics; evidence-based practice; health policy; and social determinants of health to prepare for entry into BSN-RN practice. This course will:		
	<ol style="list-style-type: none">1. Analyze systems and relationships at the meso, macro, and micro levels.2. Analyze the major characteristics of the U.S. Healthcare system.3. Utilize skills for engaging and addressing issues of diversity and social justice.4. Evaluate the financial and payment models of health care and its impact on the delivery, access, and quality of care (cost, access, and quality).5. Implement the policy development process.6. Examine the relationship of policy, regulatory requirements, and economics on care outcomes.7. Evaluate the role of nursing in policy development and political advocacy within the U.S. Healthcare system.		
	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

The Nursing Department has undergone a thorough review of curriculum based on the new American Association of Colleges of Nursing Accreditation Essentials. Upon review, NRS 425 has significant overlap with other portions of the curriculum. The new course addresses areas that are not well covered in current classes.

Anticipated Impacts to “Other” Programs

None

Impact on Library: Charie Faught has consulted with Scott Juskievicz 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): Fall 2024

APPROVALS

Department Head Approval

Date 03-26-2024

Janet Richards Coe

Dean Approval

Date 3/27/24

Katie Hawler

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

MONTANA TECH NURSING PROGRAM
COURSE SYLLABUS*
Fall 2024

Course Number: NRSRG 410 (Blended)

Credits: 3

Course Title: U.S. Health Systems: Policy, Economics and Advocacy

Instructor: Charie Faught, PhD, MHA
E-mail: cfaught@mtech.edu
Office: 496-4884
HSB 120

Office Hours: By appointment

Prerequisites: Successful completion of BSN nursing semester four, five and six

Teaching Methods: Required textbook, Power Point slides, lecture, assignments

Course Description: The purpose of this course is to allow students to critically analyze U.S. health systems and social justice. Students will evaluate U.S. health policy and economics in order to deliver equitable care. This course provides students the opportunity to integrate advocacy skills in influencing policy or formulating strategies to advance patient care.

Course Objectives: Upon completion of the course, the student will use the concepts of clinical judgment; communication; compassionate care; diversity, equity, and inclusion; ethics; evidence-based practice; health policy; and social determinants of health to prepare for entry into BSN-RN practice. This course will:

1. Analyze systems and relationships at the meso, macro, and micro levels.
2. Analyze the major characteristics of the U.S. Healthcare system.
3. Utilize skills for engaging and addressing issues of diversity and social justice.
4. Evaluate the financial and payment models of health care and its impact on the delivery, access, and quality of care (cost, access, and quality).
5. Implement the policy development process.
6. Examine the relationship of policy, regulatory requirements, and economics on care outcomes.
7. Evaluate the role of nursing in policy development and political advocacy within the U.S. Healthcare system.

AACN Threads: (Concepts for Nursing Practice)

1. Clinical Judgement

As one of the key attributes of professional nursing, clinical judgment refers to the process by which nurses make decisions based on nursing knowledge (evidence, theories, ways/patterns of knowing), other disciplinary knowledge, critical thinking, and clinical reasoning. This process is used to understand and interpret information in the delivery of care. Clinical decision making based on clinical judgment is directly related to care outcomes (AACN, 2021).

2. Communication

Communication, informed by nursing and other theories, is a central component in all areas of nursing practice. Communication is defined as an exchange of information, thoughts, and feelings through a variety of mechanisms. The definition encompasses the various ways people interact with each other, including verbal, written, behavioral, body language, touch, and emotion. Communication also includes intentionality, mutuality, partnerships, trust, and presence. Effective communication between nurses and individuals and between nurses and other health professionals is necessary for the delivery of high quality, individualized nursing care. With increasing frequency, communication is delivered through technological modalities. Communication also is a core component of team-based, interprofessional care and closely interrelated with the concept Social Determinants of Health (AACN, 2021).

3. Compassionate Care

As an essential principle of person-centered care, compassionate care refers to the way nurses relate to others as human beings and involves “noticing another person’s vulnerability, experiencing an emotional reaction to this, and acting in some way with them in a way that is meaningful for people.” Compassionate care is interrelated with other concepts such as caring, empathy, and respect and is also closely associated with patient satisfaction (AACN, 2021).

4. Diversity, Equity, and Inclusion

Collectively, diversity, equity, and inclusion (DEI) refers to a broad range of individual, population, and social constructs and is adapted in the Essentials as one of the most visible concepts. Although these are collectively considered a concept, differentiation of each conceptual element leads to enhanced understanding. Diversity references a broad range of individual, population, and social characteristics, including but not limited to age; sex; race; ethnicity; sexual orientation; gender identity; family structures; geographic locations; national origin; immigrants and refugees; language; any impairment that substantially limits a major life activity; religious beliefs; and socioeconomic status. Inclusion represents environmental and organizational cultures in which faculty, students, staff, and administrators with diverse characteristics thrive. Inclusive environments require intentionality and embrace differences, not merely tolerate them. Everyone works to ensure the perspectives and experiences of others are invited, welcomed, acknowledged, and respected in inclusive environments. Equity is the ability to recognize the differences in the resources or knowledge needed to allow individuals to fully participate in society, including access to higher education, with the goal of overcoming obstacles to ensure fairness. To have equitable systems, all people should be treated fairly, unhampered by artificial barriers, stereotypes, or prejudices. Two related concepts that fit within DEI include structural racism and social justice (AACN, 2021).

5. Ethics

Core to professional nursing practice, ethics refers to principles that guide a person’s behavior. Ethics is closely tied to moral philosophy involving the study of or examination of morality through a variety of different approaches. There are commonly accepted principles in bioethics that include autonomy, beneficence, non-maleficence, and justice. The study of ethics as it relates to nursing practice has led to the exploration of other relevant concepts, including moral distress, moral hazard, moral community, and moral or critical resilience (AACN, 2021).

6. Evidence-Based Practice

The delivery of optimal health care requires the integration of current evidence and clinical expertise with individual and family preferences. Evidence-based practice is a problem-solving approach to the delivery of health care that integrates best evidence from studies and patient care data with clinician expertise and patient preferences and values. In addition there is a need to consider those scientific studies that ask: whose perspectives are solicited, who creates the evidence, how is that evidence created, what questions remain unanswered, and what harm may be created? Answers to these questions are paramount to incorporating meaningful, culturally safe, evidence-based practice (AACN, 2021).

7. Health Policy

Health policy involves goal directed decision-making about health that is the result of an authorized public decision-making process. Nurses play critical roles in advocating for policy that impacts patients and the profession, especially when speaking with a united voice on issues that affect nursing practice and health outcomes. Nurses can have a profound influence on health policy by becoming engaged in the policy process on many levels, which includes interpreting, evaluating, and leading policy change (AACN, 2021).

8. Social Determinants of Health

Determinants of health, a broader term, include personal, social, economic, and environmental factors that impact health. Social determinants of health, a primary component of determinants of health “are the conditions in the environment where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality of life outcomes and risks.” The social determinants of health contribute to wide health disparities and inequities in areas such as economic stability, education quality and access, healthcare quality and access, neighborhood and built environment, and social and community context. Nursing practices such as assessment, health promotion, access to care, and patient teaching support improvements in health outcomes. The social determinants of health are closely interrelated with the concepts of diversity, equity, and inclusion, health policy, and communication (AACN, 2021).

American Association of Colleges of Nursing (2021). *The essentials: Core competencies for professional nursing education*. Accessible online at <https://www.aacnnursing.org/Portals/0/PDFs/Publications/Essentials-2021.pdf>

Program Outcomes

The BSN curriculum will provide nursing education that will enable the baccalaureate-prepared nurse to:

- 1. Provide safe nursing care to individuals, families and populations utilizing inter-professional communication, collaboration, clinical judgment, and a holistic framework.**
- 2. Design, manage, and evaluate person-centered nursing care in a variety of structured and unstructured settings to address individual health, population health, and social determinants of health.**
- 3. Function as a leader, advocate for health policy and resource manager in system-based practice using informatics, healthcare technology and fiscal administration.**

4. Critically appraise current research to promote understanding regarding the production of knowledge and application of evidence-based practice and nursing scholarship.
5. **Actualize a commitment to professional accountability and ethical standards in nursing practice with a focus on diversity, equity, and inclusion.**

Course Policies

Required Texts:

Nickitas, D; Middaugh, D; Feeg, V (2020). *Policy and Politics for Nurses and Other Health Professionals: Policy and Action* 3rd edition. Sudbury, MA. Jones and Bartlett.

Evaluation Methodology:

1. Assignments/Analysis/Evaluations	60%
2. Exams/Quizzes	25 %
3. Final Project/Paper	15%

Use of Cell Phones/Electronic devices: Cell phones/electronic device should be turned off or silenced during class. Students who have a legitimate need for a cell phone during class should request permission from the instructor prior to class

Testing:

Tests are scheduled on the syllabus. No make-up tests will be given unless there is an emergency. Any student failing to notify the instructor **prior** to an exam to be missed will receive a grade of zero for that exam. Make-up tests may be in a different format than the original test. **See Student handbook** for a full description of the nursing department’s testing policy.

Classroom Attendance Policy:

Attendance in lectures is essential to meet course objectives; therefore, prompt and regular attendance is required. In the event the student misses greater than **4.5 hours** of lecture, a **2% deduction** will be applied to the final grade of the course. For this class, if you are over 15 minutes late, it will go toward an hour of missed class. **Please call/email instructor to report the reason class is missed.**

Zoom/Remote Learning:

The Sherry Lesar School of Nursing requires that students attend in-person lecture. If the student does not attend in-person lecture, they will be considered absent from class.

If a student cannot attend in-person lecture for any reason, they may coordinate with their faculty to utilize the zoom technology for remote learning. However, the student will still be considered absent from class. Please email your faculty prior to class.

Academic Integrity:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and must be reported to the Vice Chancellor for Academic Affairs Office.

Disability Accommodation:

Information from Disability Services:

“Montana Tech provides reasonable accommodations to students who are registered with Disability Services. If you have been diagnosed with or believe you may have a disability, contact Disability Services to discuss accommodations, access needs, and obtain an Accommodation Letter. You can reach the Disability Services Coordinator via email at sgoodell@mtech.edu, by phone at 406-496-4428, or in person in the Academic Center for Excellence (ACE) within the Student Success Center (SSC). All services are confidential. Once you have received your letter, please meet with me to discuss your access needs.”

Grading Scale:

A	92-100%	(91.5 – 100%)
A-	90-91%	(89.5 – 91.49%)
B+	87-89%	(86.5 – 89.49%)
B	84-86%	(83.5 – 86.49%)
B-	81-83%	(80.5 – 83.49%)
C+	78-80%	(77.5 – 80.49%)
D	70-77%	(69.5 - 76.49%)
F	0-69%	(0 - 69.49%)

Tentative Schedule

Date	Student Learning Activities (Tentative)	Student Assessments
Week One	Systems	
Week Two	Differing systems and definition – ex. micro, meso and macro	
Week Three	Family System assignment – so it remains in the program and shows how varied to the definition of system	
Week Four	Policy	
Week Five	Systematically examine the origins of a national health policy and its commensurate impact on patients (e.g., social security, Medicare)	
Week Six	Select a bill in legislature to follow (including legislative process, writing a letter of testimony, visiting a hearing on that bill or another bill)	
Week Seven	Attend a public hearing on rules and regulations. Track the Internet pages of Montana’s U.S. Senators or Representative to gain a more comprehensive understanding of how legislation is introduced and	

	debated.	
Week Eight	Call a member of the Montana State Legislature to discuss a health-related issue.	
Week Nine	Economics and Finances	
Week Ten	Evaluation of health insurance policy/ies	
Week Eleven	Cost analysis of health insurance policies	
Week Twelve	DRG's implications on a client cared for in clinical setting–length of stay vs. client need for care	
Week Thirteen	Advocacy	
Week Fourteen	Community Health book resource to understand advocacy process compared to nursing process	
Week Fifteen	Role of advocate in development of public policy and economics of health care systems, skills set, communication, relationship of professional values to, boundaries (i.e. public safety vs. individual choice)	
Week Sixteen	Critically analyze effectiveness of a current health policy in relation to outcomes and effects on social determinants of health.	

3/26/24

**This syllabus is subject to revision at the instructor's discretion based on class needs and requirements.*

Student ID: _____
 Student Name: _____
 Adviser Name: _____

Catalog: 2023-2024 Catalog
 Program: Nursing (Pre-Licensure), B.S.
 Minimum Credits Required: _____

Nursing (Pre-Licensure), B.S.

Freshman

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 201/202 - Anatomy & Physiology I	4 credits			
M 121 - College Algebra	3 credits			
- OR -				
M 140 - College Math for Healthcare	3 credits			
NUTR 258 - Fundamentals of Nutrition	2 credits			
PSYX 100 - Introduction to Psychology	3 credits			
WRIT 121 - Introduction To Technical Writing	3 credits			
-OR-				
WRIT 101 - College Writing I	3 credits			

Total: 15

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 211/212 - Anatomy & Physiology II	4 credits			
SOCI 101 - Introduction to Sociology	3 credits			
PSYX 230 - Developmental Psychology	3 credits			
CHMY 121 - Introduction to General Chemistry	3 credits			
NRSG 107 - Perspectives in Professional Nursing	2 credits			
CHMY 122 - Introduction to General Chemistry Lab	1 credit			
-OR-				
CHMY 142 - College Chemistry Laboratory I	1 credit			

Total: 16

Sophomore

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOM 250 - Microbiology for Health Sciences	3 credits			
BIOM 251 - Microbiology for Health Sciences Lab	1 credit			
Humanities & Fine Arts Elective 3 credits				
STAT 216 - Introduction to Statistics	3 credits			
-OR-				
STAT 131 - Introduction to Biostatistics	3 credits			
HCI 316 - Health Care Ethics & Regulations	3 credits			
-OR-				
PHL 325W - Professional Ethics	3 credits			
WRIT 322W - Advanced Business Writing	3 credits			
-OR-				
WRIT 201 - College Writing II	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 230 - Nursing Pharmacology	3 credits			
NRSNG 210 - Foundations of Professional Nursing	4 credits			
NRSNG 215 - Assessment and Health Promotion	3 credits			
NRSNG 256 - Pathophysiology	3 credits			

Total: 13

Junior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 308 - Nursing for Healthy Aging	3 credits			
NRSNG 312 - Mgmt of Adults with Common Health Alterations	7 credits			
NRSNG 315 - Evidence Based Practice	3 credits			
NRSNG 320 - Nursing Informatics	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 330 - Mental Health Nursing	4 credits			
NRSNG 313 - Mgmt of the Adult with Complex Health Alterations	4 credits			
NRSNG 340 - Transitional Care	3 credits			
NRSNG 351 - Advanced Nursing Concepts and Clinical Judgment	3 credits			

Total: 14

Senior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 405 - Pediatrics Nursing	4 credits			
NRSNG 415 - Nursing Care of the Childbearing Family	4 credits			
NRSNG 425 - Concepts in Family Nursing	3 credits			
NRSNG 430 - Healthcare from the Patient's Perspective	3 credits			

Total: 14

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 436 - A Population Perspective	4 credits			
NRSNG 407 - Integrated Health Assessment	3 credits			
NRSNG 450W - Global Health, Healthcare Policy and Finance	3 credits			
NRSNG 499 - Leading and Managing: Capstone Experience	6 credits			

Total: 16

Minimum credits for a B.S. degree in Nursing: 120

Notes:

Student ID: _____
 Student Name: _____
 Adviser Name: _____

Catalog: 2024-2025 Catalog
 Program: Nursing (Pre-Licensure), B.S.
 Minimum Credits Required: _____

Nursing (Pre-Licensure), B.S.

Freshman

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 201/202 - Anatomy & Physiology I	4 credits			
M 121 - College Algebra	3 credits			
- OR -				
M 140 - College Math for Healthcare	3 credits			
NUTR 258 - Fundamentals of Nutrition	2 credits			
PSYX 100 - Introduction to Psychology	3 credits			
WRIT 121 - Introduction To Technical Writing	3 credits			
-OR-				
WRIT 101 - College Writing I	3 credits			

Total: 15

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 211/212 - Anatomy & Physiology II	4 credits			
SOCI 101 - Introduction to Sociology	3 credits			
PSYX 230 - Developmental Psychology	3 credits			
CHMY 121 - Introduction to General Chemistry OR	3 credits			
CHMY 141- College Chemistry I	3 credits			
NRSG 107 - Perspectives in Professional Nursing	2 credits			
CHMY 122 - Introduction to General Chemistry Lab	1 credit			
-OR-				
CHMY 142 - College Chemistry Laboratory I	1 credit			

Total: 16

Sophomore

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOM 250 - Microbiology for Health Sciences	3 credits			
BIOM 251 - Microbiology for Health Sciences Lab	1 credit			
Humanities & Fine Arts Elective 3 credits				
STAT 216 - Introduction to Statistics	3 credits			
-OR-				
STAT 131 - Introduction to Biostatistics	3 credits			
HCI 316 - Health Care Ethics & Regulations	3 credits			
-OR-				
PHL 325W - Professional Ethics	3 credits			
WRIT 322W - Advanced Business Writing	3 credits			
-OR-				
WRIT 201 - College Writing II	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 230 - Nursing Pharmacology	3 credits			
NRSNG 210 - Foundations of Professional Nursing	4 credits			
NRSNG 215 - Assessment and Health Promotion	3 credits			
NRSNG 256 - Pathophysiology	3 credits			

Total: 13

Junior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 308 - Nursing for Healthy Aging	3 credits			
NRSNG 312 - Mgmt of Adults with Common Health Alterations	7 credits			
NRSNG 315 - Evidence Based Practice	3 credits			
NRSNG 320 - Nursing Informatics	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 330 - Mental Health Nursing	4 credits			
NRSNG 313 - Mgmt of the Adult with Complex Health Alterations	4 credits			
NRSNG 340 - Transitional Care	3 credits			
NRSNG 351 - Advanced Nursing Concepts and Clinical Judgment	3 credits			

Total: 14

Senior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 405 - Pediatrics Nursing	4 credits			
NRSNG 415 - Nursing Care of the Childbearing Family	4 credits			
NRSNG 410 - U.S. Health Systems: Policy, Economics and Advocacy	3 credits			
NRSNG 430 - Healthcare from the Patient's Perspective	3 credits			

Total: 14

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 436 - A Population Perspective	4 credits			
NRSNG 407 - Integrated Health Assessment	3 credits			
NRSNG 450W - Global Health: Policy, Finance and Nursing Care	3 credits			
NRSNG 499 - Leading and Managing: Capstone Experience	6 credits			

Total: 16

Minimum credits for a B.S. degree in Nursing: 120

Notes:

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 fewer.
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 March 26, 2024

Dept. Nursing

Program Nursing

College CLSPS

CRC Representative Laurie Noel/Charie Faught

Description of Request: _____

Update NRSG 450W

Current Course or Program Information: _____

See Below

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
	Update Course name and description:		
	NRSG 450W Global Health: Policy, Finance, and Nursing Care 3 Credits Pre-req- Successful completion of all previous courses		
	The focus of the course is to examine global healthcare policy, financial structure, and the regulatory environments that impact nursing practice and client care. This course will also analyze current and emerging global health priorities, including emerging infectious diseases, poverty, health inequity, health system reforms, and major global initiatives in disease prevention and health promotion. This course meets the upper-level writing requirement.		
	Course Outcomes (same as before):		
	<ol style="list-style-type: none">1. Integrate evidence-based practice in analyzing global issues2. Analyze global disparities related to health, climate, social, political, and ethical issues.3. Formulate strategies to promote interdisciplinary collaboration and communication in addressing global issues4. Analyze different countries based on funding, policy, finance, and regulatory environments.5. Determine information management and patient care technologies in the improvement of global health.6. Demonstrate professional accountability, ethical responsibility, and leadership in the provision of nursing care.		
	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

The Nursing Department has undergone a thorough review of curriculum based on the new American Association of Colleges of Nursing Accreditation Essentials. Upon review, the course title should reflect the global aspects of the course, which helps to align the new course with a focus on the U.S. Health System.

Anticipated Impacts to "Other" Programs

None

Impact on Library: Charie Faught has consulted with Scott Juskievicz 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): Fall 2024

APPROVALS

Department Head Approval

Date 03-26-2024

Janet Richards Coe

Dean Approval

Date 3/27/24

Katie Hawler

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

**MONTANA TECH NURSING PROGRAM
COURSE SYLLABUS
2024**

Course Number: NRSRG 450W **Credits: 3**
Lecture: 45 hrs.
Lab/Clinical: 0 hrs.

Course Title: Global Health: Policy, Finance, and Nursing Care

Instructor: Maureen Brophy MN, RN

Office Hours: By appointment

Pre/Corequisites: Successful completion of all previous courses

Teaching Methods: Lecture, group discussion, discussion board, research on specific assigned topics and class presentation

Course Description:

The focus of the course is to examine global healthcare policy, financial structure, and the regulatory environments that impact nursing practice and client care. This course will also analyze current and emerging global health priorities, including emerging infectious diseases, poverty, health inequity, health system reforms, and major global initiatives in disease prevention and health promotion. This course meets the upper-level writing requirement.

Catalog Course Description:

The focus of the course is to examine global healthcare policy, financial structure, and the regulatory environments that impact nursing practice and client care. This course will also analyze current and emerging global health priorities and major global initiatives in disease prevention and health promotion. This course meets the upper-level writing requirement.

Course Objectives: Upon completion of the course, the student will use the concepts of clinical judgment; communication; compassionate care; diversity, equity, and inclusion; ethics; evidence-based practice; and social determinants of health to prepare for entry into BSN-RN practice. This course will:

Course Objectives:

1. Integrate evidence-based practice in analyzing global issues
2. Analyze global disparities related to health, climate, social, political, and ethical issues.

This syllabus is subject to change at any time based on class needs and instructor's judgment. 3/26/2024

3. Formulate strategies to promote interdisciplinary collaboration and communication in addressing global issues
4. Analyze different countries based on funding, policy, finance, and regulatory environments.
5. Determine information management and patient care technologies in the improvement of global health.
6. Demonstrate professional accountability, ethical responsibility, and leadership in the provision of nursing care.

ANCC Threads: (Concepts for Nursing Practice) *Put in bold the threads which are in the class*

1. Clinical Judgement

As one of the key attributes of professional nursing, clinical judgment refers to the process by which nurses make decisions based on nursing knowledge (evidence, theories, ways/patterns of knowing), other disciplinary knowledge, critical thinking, and clinical reasoning. This process is used to understand and interpret information in the delivery of care. Clinical decision making based on clinical judgment is directly related to care outcomes (AACN, 2023).

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4. Diversity, Equity, and Inclusion

Collectively, diversity, equity, and inclusion (DEI) refers to a broad range of individual, population, and social constructs and is adapted in the Essentials as one of the most visible concepts. Although these are collectively considered a concept, differentiation of each conceptual element leads to enhanced understanding. Diversity references a broad range of individual, population, and social characteristics,

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including but not limited to age; sex; race; ethnicity; sexual orientation; gender identity; family structures; geographic locations; national origin; immigrants and refugees; language; any impairment that substantially limits a major life activity; religious beliefs; and socioeconomic status. Inclusion represents environmental and organizational cultures in which faculty, students, staff, and administrators with diverse characteristics thrive. Inclusive environments require intentionality and embrace differences, not merely tolerate them. Everyone works to ensure the perspectives and experiences of others are invited, welcomed, acknowledged, and respected in inclusive environments. Equity is the ability to recognize the differences in the resources or knowledge needed to allow individuals to fully participate in society, including access to higher education, with the goal of overcoming obstacles to ensure fairness. To have equitable systems, all people should be treated fairly, unhampered by artificial barriers, stereotypes, or prejudices. Two related concepts that fit within DEI include structural racism and social justice (AACN, 2023).

5. Ethics

Core to professional nursing practice, ethics refers to principles that guide a person's behavior. Ethics is closely tied to moral philosophy involving the study of or examination of morality through a variety of different approaches. There are commonly accepted principles in bioethics that include autonomy, beneficence, non-maleficence, and justice. The study of ethics as it relates to nursing practice has led to the exploration of other relevant concepts, including moral distress, moral hazard, moral community, and moral or critical resilience (AACN, 2023).

6. Evidence-Based Practice

The delivery of optimal health care requires the integration of current evidence and clinical expertise with individual and family preferences. Evidence-based practice is a problem-solving approach to the delivery of health care that integrates best evidence from studies and patient care data with clinician expertise and patient preferences and values. In addition there is a need to consider those scientific studies that ask: whose perspectives are solicited, who creates the evidence, how is that evidence created, what questions remain unanswered, and what harm may be created? Answers to these questions are paramount to incorporating meaningful, culturally safe, evidence-based practice (AACN, 2023).

7. Health Policy

Health policy involves goal directed decision-making about health that is the result of an authorized public decision-making process. Nurses play critical roles in advocating for policy that impacts patients and the profession, especially when speaking with a united voice on issues that affect nursing practice and health outcomes. Nurses can have a profound influence on health policy by becoming engaged in the policy process on many levels, which includes interpreting, evaluating, and leading policy change (AACN, 2023).

8. Social Determinants of Health

Determinants of health, a broader term, include personal, social, economic, and environmental factors that impact health. Social determinants of health, a primary

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component of determinants of health “are the conditions in the environment where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality of life outcomes and risks.” The social determinants of health contribute to wide health disparities and inequities in areas such as economic stability, education quality and access, healthcare quality and access, neighborhood and built environment, and social and community context. Nursing practices such as assessment, health promotion, access to care, and patient teaching support improvements in health outcomes. The social determinants of health are closely interrelated with the concepts of diversity, equity, and inclusion, health policy, and communication (AACN, 2023).

Student Learning Outcomes:

1. Examine concepts and principles in improving health and achieving equity globally. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion, Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 4, 5
2. Analyze disparities in healthcare based on social, cultural, political, and ethical issues. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion, Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 4, 5
3. Examine health care systems in other countries related to differences in funding, health care advantages, and disadvantages. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion, Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 4, 5
4. Analyze the interrelationship of climate change and environmental issues on the health of populations. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion, Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 4, 5
5. Develop an understanding related to funding and resources in the improvement of global health. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion, Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 3, 4, 5
7. Examine the importance of interprofessional collaboration in the promotion of global health. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion, Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 4, 5
8. Develop an awareness of self-influence in improvement of global health. Clinical Judgement, Communication, Compassionate Care, Diversity, Equity, and Inclusion,

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Ethics, Evidence-Based Practice, Social Determinants of Health) Essentials Domains: 1, 2, 5, 6, 7, 8, 9, 10; Program Outcomes: 1, 2, 4, 5

ANCC Threads: (Concepts for Nursing Practice) *Put in bold the threads which are in the class*

9. Clinical Judgement

As one of the key attributes of professional nursing, clinical judgment refers to the process by which nurses make decisions based on nursing knowledge (evidence, theories, ways/patterns of knowing), other disciplinary knowledge, critical thinking, and clinical reasoning. This process is used to understand and interpret information in the delivery of care. Clinical decision making based on clinical judgment is directly related to care outcomes (AACN, 2023).

10. Communication

Communication, informed by nursing and other theories, is a central component in all areas of nursing practice. Communication is defined as an exchange of information, thoughts, and feelings through a variety of mechanisms. The definition encompasses the various ways people interact with each other, including verbal, written, behavioral, body language, touch, and emotion. Communication also includes intentionality, mutuality, partnerships, trust, and presence. Effective communication between nurses and individuals and between nurses and other health professionals is necessary for the delivery of high quality, individualized nursing care. With increasing frequency, communication is delivered through technological modalities. Communication also is a core component of team-based, interprofessional care and closely interrelated with the concept Social Determinants of Health (AACN, 2023).

11. Compassionate Care

As an essential principle of person-centered care, compassionate care refers to the way nurses relate to others as human beings and involves “noticing another person’s vulnerability, experiencing an emotional reaction to this, and acting in some way with them in a way that is meaningful for people.” Compassionate care is interrelated with other concepts such as caring, empathy, and respect and is also closely associated with patient satisfaction (AACN, 2023).

12. Diversity, Equity, and Inclusion

Collectively, diversity, equity, and inclusion (DEI) refers to a broad range of individual, population, and social constructs and is adapted in the Essentials as one of the most visible concepts. Although these are collectively considered a concept, differentiation of each conceptual element leads to enhanced understanding. Diversity references a broad range of individual, population, and social characteristics, including but not limited to age; sex; race; ethnicity; sexual orientation; gender identity; family structures; geographic locations; national origin; immigrants and refugees; language; any impairment that substantially limits a major life activity; religious beliefs; and socioeconomic status. Inclusion represents environmental and organizational cultures in which faculty, students, staff, and administrators with diverse characteristics thrive. Inclusive environments require intentionality and

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embrace differences, not merely tolerate them. Everyone works to ensure the perspectives and experiences of others are invited, welcomed, acknowledged, and respected in inclusive environments. Equity is the ability to recognize the differences in the resources or knowledge needed to allow individuals to fully participate in society, including access to higher education, with the goal of overcoming obstacles to ensure fairness. To have equitable systems, all people should be treated fairly, unhampered by artificial barriers, stereotypes, or prejudices. Two related concepts that fit within DEI include structural racism and social justice (AACN, 2023).

13. Ethics

Core to professional nursing practice, ethics refers to principles that guide a person's behavior. Ethics is closely tied to moral philosophy involving the study of or examination of morality through a variety of different approaches. There are commonly accepted principles in bioethics that include autonomy, beneficence, non-maleficence, and justice. The study of ethics as it relates to nursing practice has led to the exploration of other relevant concepts, including moral distress, moral hazard, moral community, and moral or critical resilience (AACN, 2023).

14. Evidence-Based Practice

The delivery of optimal health care requires the integration of current evidence and clinical expertise with individual and family preferences. Evidence-based practice is a problem-solving approach to the delivery of health care that integrates best evidence from studies and patient care data with clinician expertise and patient preferences and values. In addition there is a need to consider those scientific studies that ask: whose perspectives are solicited, who creates the evidence, how is that evidence created, what questions remain unanswered, and what harm may be created? Answers to these questions are paramount to incorporating meaningful, culturally safe, evidence-based practice (AACN, 2023).

15. Health Policy

Health policy involves goal directed decision-making about health that is the result of an authorized public decision-making process. Nurses play critical roles in advocating for policy that impacts patients and the profession, especially when speaking with a united voice on issues that affect nursing practice and health outcomes. Nurses can have a profound influence on health policy by becoming engaged in the policy process on many levels, which includes interpreting, evaluating, and leading policy change (AACN, 2023).

16. Social Determinants of Health

Determinants of health, a broader term, include personal, social, economic, and environmental factors that impact health. Social determinants of health, a primary component of determinants of health “are the conditions in the environment where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality of life outcomes and risks.” The social determinants of health contribute to wide health disparities and inequities in areas such as economic stability, education quality and access, healthcare quality and access, neighborhood and built environment, and social and community context. Nursing

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practices such as assessment, health promotion, access to care, and patient teaching support improvements in health outcomes. The social determinants of health are closely interrelated with the concepts of diversity, equity, and inclusion, health policy, and communication (AACN, 2023).

American Association of Colleges of Nursing (2023). *The essentials: Core competencies for professional nursing education*.
<https://www.aacnursing.org/Essentials/Concepts>

ANCC Competencies:

This course **introduces** and **applies**: *Domain, Competencies, and Sub-competencies*

Domain 1: Knowledge for Nursing Practice

- 1.1 a, b, c, d
- 1.2 a, b, c, d
- 1.3 a, b, c

Domain 2: Person-Centered Care

- 2.1 a, b, c
- 2.2 a, b, c, d, e, f
- 2.3 a, b, c, d, e, f, g
- 2.4 a, b, c, d, e
- 2.5 a, b, c, d, e, f, g
- 2.6 a, b, c, d
- 2.7 a, b, c
- 2.8 a, b, c, d, e
- 2.9 a, b, c, d, e

Domain 4: Scholarship for the Nursing Discipline

- 4.2 a, c

Domain 5: Quality and Safety

- 5.1 a, b, c, d, e, f, g, h
- 5.2 a, b, c, d, e, f
- 5.3 a, b, c, d

Domain 6: Interdisciplinary Partnerships

- 6.1 a, b, c, d, e, f
- 6.2 a, b, c, d, e, f
- 6.3 a, b, c
- 6.4 a, b, c,

Domain 7: Systems-Based Practice

- 7.1 a, c, d
- 7.2 b, c
- 7.3 a, d

Domain 8: Informatics and Healthcare Technologies

- 8.1 a, b, c, d, e, f
- 8.2 a, c
- 8.3 a, b, c, d, e
- 8.4 a, b, c

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8.5 a, b, c, d, e,

Domain 9: Professionalism

9.1 a, b, c, d, e, f, g

9.2 b, c, d, e, f

9.3 a, b, c, d, f, g, h

9.4 b, c

9.5 b, c, d, e

9.6 a, b, c

Domain 10: Personal, Professional, and Leadership Development

10.1 a, b

10.2 a, b, c, d

10.3 e, g, i

Program Outcomes

The BSN curriculum will provide nursing education that will enable the baccalaureate-prepared nurse to:

1. Provide safe nursing care to individuals, families and populations utilizing inter-professional communication, collaboration, clinical judgment, and a holistic framework.
2. Design, manage, and evaluate person-centered nursing care in a variety of structured and unstructured settings to address individual health, population health, and social determinants of health.
3. Function as a leader, advocate for health policy and resource manager in system-based practice using informatics, healthcare technology and fiscal administration.
4. Critically appraise current research to promote understanding regarding the production of knowledge and application of evidence-based practice and nursing scholarship.
5. Actualize a commitment to professional accountability and ethical standards in nursing practice with a focus on diversity, equity, and inclusion.

Evaluation:

Course grade breakdown:	Academic papers	60%
	Discussion/Presentations	40%
	Certificate Presentations	pass/fail
	<u>Total:</u>	<u>100%</u>

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Grading Scale:

A	92-100%	(91.5 – 100%)
A-	90-91%	(89.5 – 91.49%)
B+	87-89%	(86.5 – 89.49%)
B	84-86%	(83.5 – 86.49%)
B-	81-83%	(80.5 – 83.49%)
C+	78-80%	(77.5 – 80.49%)
D	70-77%	(69.5- 77.49%)
F	0-69%	(0- 69.49%)

Attendance

The Sherry Lesar School of Nursing requires that students attend in-person lecture. If the student does not attend in-person lecture, they will be considered absent from class.

If a student cannot attend in-person lecture for any reason, they may coordinate with their faculty to utilize the zoom technology for remote learning. However, the student will still be considered absent from class. Please email your faculty prior to class.

The student is allowed to miss **4 hours** of lecture for the semester.

In the event the student exceeds the 4-hour limit, he/she will be unable to meet the attendance requirement for **this** course and a 2% deduction will be applied to the final grade of the course.

Required Texts:

Holtz, C. (2022) *Global health care issues and policies 4th edition*. Jones and Bartlett

Assignments

Assessment for successful completion of the course will be based on the following criteria:

60% 3 Academic Papers, each worth 50 points for a total of 150 points.

The criteria for each of these papers is outlined in the schedule of the syllabus as well as on Moodle. The papers require outside academic sources. Remember that academic sources in Nursing should not be older than **5 years** can come from foreign sources – however, should be comparable to the population being discussed, and need to be from a credible source. If you have any questions about how academic sources are defined, the Library is always

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available for refreshers on this subject. **Assignment dates listed in syllabus. All due date times are 11:59 pm.**

40% **Student led face to face group discussion/presentations, each student's presentation is worth 20 points. Assignment dates listed in syllabus.** The group discussions require that you utilize your text as a source but include other academic sources at your discretion in order to have a broader understanding of the material. See presentation rubric.

The power point presentations must be in APA format unless specified in the assignment instructions. Power points must have citations in text and a reference page at the end of the power point that includes the group's references. Remember, this is a writing course – therefore, APA counts towards your grade.

Being concise in your writing is a skill that will be developed throughout this course. If you struggle with APA, again, the Library is an excellent resource.

The presenting group's power point post is due by midnight, MST on the day before the face-to-face assignment each week. The responding group (each student) must then reply to the presenters by midnight on Thursday of the assignment week.

Group or individual failure to post or reply on time will result in a ½ off late penalty. Submissions equal to or greater than 2 days late will not be corrected and will be assigned a "0".

In the event a student is unable to attend class during Presentation/Response Discussions the student may submit his/her presentation/response but will receive ½ off.

Pass/fail Achieve 2 Certificates. Failure to provide proof for either certificate **ON TIME** will result in course failure.

Pass/fail End of semester certificate presentation 4-6 power point slides. Guidelines in certificate outline.

Academic Honesty Policy

Montana Tech believes that academic honesty and integrity are fundamental to higher education. Montana Tech has a responsibility to promote academic honesty, integrity, and the highest ethical and professional standards and behavior in and out of the classroom. Accordingly, policies and procedures have been developed to address instances of academic dishonesty. Students who violate these standards commit academic misconduct and will be subject to academic and/or disciplinary sanctions. Please refer to the MT Tech student and Nursing handbooks for further details regarding definition of academic dishonesty, consequences of academic dishonesty and policies regarding action against academic dishonesty.

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Disability Accommodation:

“Montana Tech provides reasonable accommodations to students who are registered with Disability Services. If you have been diagnosed with or believe you may have a disability, contact Disability Services to discuss accommodations, access needs, and obtain an Accommodation Letter. You can reach the Disability Services Coordinator via email at sgoodell@mtech.edu, by phone at 406-496-4428, or in person in the Academic Center for Excellence (ACE) within the Student Success Center (SSC). All services are confidential. Once you have received your letter, please meet with me to discuss your access needs.”

Tentative Course Schedule

Note*- each group will have a presentation the day after a paper is due

Date	Supporting Course Content	Student Learning Activities	Student Assessments
<p>Week 1: January 8-9 Monday www- no class Tuesday - Face to face 0800- 0930 HSB 102</p> <p>Student learning objectives: 1 and 3 Student learning outcomes: 1, 3, 8 Program outcome: 2, 3, 4, 5</p>	<p>Review Syllabus</p> <p>Chapter 1 – Global Health Issues Policy, and Healthcare Delivery</p> <p>Chapter 3- Developing Countries: Egypt, China, India, and South Africa</p>	<p>Print syllabus and bring a copy to class Presentation/ response: Answer the questions in Moodle</p> <p>Note that this class is a hybrid class that fulfills one of the writing requirements so that your papers and postings will be graded very strictly when it comes to grammar, spelling, punctuation, APA formatting, and how you organize your ideas.</p>	<p>Group presentation due Monday</p> <p>Both Groups presentation</p>

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<p>Week 2: January 15-16</p> <p>Tuesday- entire group presentation of week 1 questions. This week work together in pairs of two or three. Face to face 0800-0930 HSB 102</p> <p>Student learning objectives: 1, 2, 3, 4, 8 Student learning outcomes: 1, 3, 7, 9 Program outcomes: 3, 4, 5</p>	<p>Chapter 4- Global Perspective on Economics and Healthcare Finance</p>	<p>In a 3-5-page APA formatted paper with at least 2 academic sources other than your text, answer the questions in Moodle.</p>	<p>Written paper: Due by Sunday of this week.</p>
<p>Week 3: January 22-23</p> <p>Tuesday face to face group 1 presentation 0800-0930 HSB 102</p> <p>Student learning objectives: 1, 2, 3, 4, 8 Student learning outcomes: 1, 3, 7, 9 Program outcomes: 3, 4, 5</p>	<p>Chapter 5- Human Trafficking: The pandemic of modern society</p> <p>Chapter 6- Social determinants of health</p>	<p>Presentation/ response: Answer the questions in Moodle week 3.</p>	<p>Group 1 presentation.</p> <p>Group 2 response by Thursday of this week</p>
<p>Week 4: January 29-30 Monday www</p> <p>Tuesday- face to face group 2 presentation 0800-0930 HSB 102</p>	<p>Chapter 7- Health and healthcare of native Americans/Alaskans/Alaskan Indians</p> <p>Chapter 11 – Infectious diseases from a global perspective</p>	<p>Presentation/ response: Answer the questions in Moodle week 4.</p>	<p>Group 2 presentation.</p> <p>Group 1 response by Thursday of this week</p>
<p>Week 5: online week- Monday and Tuesday February 5-6</p>	<p>Global interest paper- identified by the student. No two students can complete the same course.</p>	<p>Paper #2 – due Sunday by 11:59 p.m.</p>	<p>Written paper: Due by Sunday of this week.</p>

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<p>Student learning objectives: 1, 2, 4 Student learning outcomes: 1, 8 Program Outcomes: 5</p>	<p>Go to the following website: https://www.globalhealthlearning.org</p> <p>Register for the site. Pick a global certification course of interest. Research the subject further outside of the website. Submit the first draft of a paper answering the questions.</p>	<p>In a 3-5-page APA formatted paper with at least 2 academic sources other than your text and the provided website.</p> <p>Answer the following questions: Discuss the topic of interest, why is it an interest to you? What are your objectives in taking the course? Discuss current research on the subject. Discuss any conflicting data that may exist regarding your topic. Discuss measures to address better outcomes for your area of interest and its importance to global health.</p>	<p>This is a first draft and will need to be revised and resubmitted later in the semester. HOWEVER, it is expected that you answer the questions to the best of your ability for the first draft, then for the revision – take into consideration any feedback and what you learn when you earn the certification and incorporate these into your final draft.</p>
<p>Week 6: February 12-13</p> <p>Tuesday- face to face group 1 presentation 0800-0930 HSB 102</p> <p>Student learning objectives: 1, 2, 4 Student learning outcomes: 1, 8 Program Outcomes: 5</p>	<p>Chapter 12 – HIV/AIDS, Stigma and disclosure: A need for human rights perspective</p> <p>Chapter 13 – Global use of complimentary and integrative health approaches</p>	<p>Presentation/ response: Chapters 12 and 13: Answer the questions in Moodle week 6.</p>	<p>Group 1 – paper too presentation.</p> <p>Group 2 response by Thursday of this week</p>
<p>Week 7 February 19-20</p>	<p>Chapter 15- Violence, injury and Occupational Health</p>	<p>Presentation/ response: Answer the questions in</p>	<p>Group 2 presentation.</p>

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<p>Tuesday 0800-0930- group 2 presentation HSB 102</p> <p>Student learning objectives: 1, 2, 4 Student learning outcomes: 1, 8 Program Outcomes: 5</p>	<p>Chapter 16- Global perspectives on nutrition</p>	<p>Moodle.</p>	<p>Group 1 response by Thursday of this week</p>
<p>Week 8: February 26-27</p> <p>Tuesday- 0800-0900 face to face presentation group 2 HSB 102</p> <p>Student learning objectives: 1, 2, 4 Student learning outcomes: 1, 8 Program Outcomes: 5</p>	<p>Revision/final Paper #2 due 11:59 p.m. Sunday March 4th</p> <p>Chapter 17- Global perspectives on environmental health</p> <p>Chapter 19- Life span health issues: Reproduction and infants</p>	<p>Presentation/ response: Answer the questions: see guidelines in Moodle.</p>	<p>Final Draft of Written Paper Due by Sunday of this week</p> <p>AND</p> <p>Discussion Board Participation:</p> <p>Group 2 –paper too presentation. Group 1 response by Thursday of this week</p>
<p>Week 9: March 4-5 Monday- face to face presentation group 1- 1030-1230 HSB 102</p> <p>Student learning objectives: 1, 3, 4 Student learning outcomes: 1, 3, 7, 9 Individual Student Learning Outcomes: 8 Program Outcomes: 5</p>	<p>Chapter 20- Global health of children</p> <p>Chapter 22- A unique perspective on health care in Panama</p>	<p>Presentation/ response: Answer the questions in Moodle.</p>	<p>Discussion Board Participation:</p> <p>Group 1 presentation. Group 2 response by Thursday of this week</p>
<p>Week 10 March 11-12 Monday and Tuesday-</p>	<p>Again, go to the following website: https://www.globalhealthlear</p>	<p>Achieve a Certificate</p>	<p>Proof of achievement of certificate of</p>

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<p>online week</p> <p>Student learning objectives: 1, 4, 6 Student learning outcomes: 1, 3 Program Outcomes:4, 5</p>	<p>ning.org</p> <p>Pick a certification that focuses on a cross cutting topic areas such as the management of logistics and commodities for health, environmental issues, health systems strengthening, governance, resources, infrastructure for good governance, rather than an individual. Completed the certification for this topic.</p>		<p>interest due Sunday of this week.</p>
<p>Week 11 March 25-26 Face to face presentation group 2 face to face Tuesday-0800-0930 HSB 102</p> <p>Student learning objectives: 1, 4, 6 Student learning outcomes: 1, 3 Program Outcomes:4, 5</p>	<p>Chapter 19 – Expanding Access to Address Priority Health Needs in Low Resource Settings</p> <p>Chapter 20 – The Challenges of International Nurse Migration: Seeking Global Solutions</p>	<p>Presentation/ response: Answer the questions in Moodle</p>	<p>Certificate <u>AND</u> Presentation: Groups 1 & 2</p>
<p>Week 12 April 1-2 online week</p> <p>Student learning objectives: 1, 4, 6 Student learning outcomes: 1, 3 Program Outcomes:4, 5</p>	<p>Emerging global health issues and the nurse’s role</p>	<p>In a 3-5-page APA formatted paper with at least 2 academic sources and the provide website. Choose an emerging global health issue and answer the questions in Moodle.</p>	<p>Written paper: Due by Sunday of this week.</p>
<p>Week 13 April 8-9 Monday – face to face 1045-1215 HSB 102</p> <p>Tuesday- face to face 0800-0930</p>	<p>Class Presentations- 15 minutes each</p> <p>Area of interest/Certification system/organization discussion</p> <p>Learning Communities</p>	<p>Students assigned to present this week will present the course and the certification they achieved for their area of interest. They will review</p>	<p>Written participation: provided during class</p>

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<p>HSB 102</p> <p>Student learning objectives: 1, 4, 5 Student learning outcomes: 2, 3, 5, 6, 8 Program Outcomes: 1, 2, 4, 5</p>		<p>why this area was of interest and any new or exciting information they learned. They will also include a brief discussion of how this topic is being addressed for better outcomes.</p> <p>This is an informal discussion about your area of interest and passion related to that area presented in a short 4-6 slide power-point.</p>	
<p>Week 14 April 15-16 Monday- face to face 1015-1215 HSB 102</p> <p>Tuesday- face to face 0800-0930 HSB 102</p> <p>Student learning objectives: 1, 2, 4 Student learning outcomes: 1, 3, 7, 9 Program Outcomes: 1, 2</p>	<p>Class Presentations- 15 minutes each</p> <p>Area of interest/Certification system/organization discussion</p> <p>Learning Communities</p>	<p>Students assigned to present this week will present the course and the certification they achieved for their area of interest. They will review why this area was of interest and any new or exciting information they learned. They will also include a brief discussion of how this topic is being addressed for better outcomes.</p> <p>This is an informal discussion about your area of interest and passion related to that area presented in a short 4-6 slide power point.</p>	<p>Written Participation: provided during class</p>

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<p>Week 15 April 22-23 Monday- face to face 1015-1215 HSB 102</p> <p>Tuesday- face to face 0800-0930 HSB 102</p> <p>Student learning objectives: 1, 2, 4 Student learning outcomes: 1, 3, 7, 9 Program Outcomes: 1, 2</p>	<p>Class Presentations- 15 minutes each</p> <p>Area of interest/Certification system/organization discussion</p> <p>Learning Communities</p>	<p>Students assigned to present this week will present the course and the certification they achieved for their area of interest.</p> <p>They will review why this area was of interest and any new or exciting information they learned. They will also include a brief discussion of how this topic is being addressed for better outcomes.</p> <p>This is an informal discussion about your area of interest and passion related to that area presented in a short 4-6 slide power point.</p>	<p>Written Participation: provided during class</p>
<p>Finals Week April 29-May 3 Face to face</p>	<p>Final evaluation</p> <p>Please don't schedule any trips until finals week is over.</p>	<p>Wrap up and evaluation</p>	<p>No Final in this course. However, your grade will not be posted in Moodle until the Course Evaluation has been completed!!!</p>

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Student ID: _____
 Student Name: _____
 Adviser Name: _____

Catalog: 2023-2024 Catalog
 Program: Nursing (Pre-Licensure), B.S.
 Minimum Credits Required: _____

Nursing (Pre-Licensure), B.S.

Freshman

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 201/202 - Anatomy & Physiology I	4 credits			
M 121 - College Algebra	3 credits			
- OR -				
M 140 - College Math for Healthcare	3 credits			
NUTR 258 - Fundamentals of Nutrition	2 credits			
PSYX 100 - Introduction to Psychology	3 credits			
WRIT 121 - Introduction To Technical Writing	3 credits			
-OR-				
WRIT 101 - College Writing I	3 credits			

Total: 15

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 211/212 - Anatomy & Physiology II	4 credits			
SOCI 101 - Introduction to Sociology	3 credits			
PSYX 230 - Developmental Psychology	3 credits			
CHMY 121 - Introduction to General Chemistry	3 credits			
NRSG 107 - Perspectives in Professional Nursing	2 credits			
CHMY 122 - Introduction to General Chemistry Lab	1 credit			
-OR-				
CHMY 142 - College Chemistry Laboratory I	1 credit			

Total: 16

Sophomore

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOM 250 - Microbiology for Health Sciences	3 credits			
BIOM 251 - Microbiology for Health Sciences Lab	1 credit			
Humanities & Fine Arts Elective 3 credits				
STAT 216 - Introduction to Statistics	3 credits			
-OR-				
STAT 131 - Introduction to Biostatistics	3 credits			
HCI 316 - Health Care Ethics & Regulations	3 credits			
-OR-				
PHL 325W - Professional Ethics	3 credits			
WRIT 322W - Advanced Business Writing	3 credits			
-OR-				
WRIT 201 - College Writing II	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 230 - Nursing Pharmacology	3 credits			
NRSNG 210 - Foundations of Professional Nursing	4 credits			
NRSNG 215 - Assessment and Health Promotion	3 credits			
NRSNG 256 - Pathophysiology	3 credits			

Total: 13

Junior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 308 - Nursing for Healthy Aging	3 credits			
NRSNG 312 - Mgmt of Adults with Common Health Alterations	7 credits			
NRSNG 315 - Evidence Based Practice	3 credits			
NRSNG 320 - Nursing Informatics	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 330 - Mental Health Nursing	4 credits			
NRSNG 313 - Mgmt of the Adult with Complex Health Alterations	4 credits			
NRSNG 340 - Transitional Care	3 credits			
NRSNG 351 - Advanced Nursing Concepts and Clinical Judgment	3 credits			

Total: 14

Senior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 405 - Pediatrics Nursing	4 credits			
NRSNG 415 - Nursing Care of the Childbearing Family	4 credits			
NRSNG 425 - Concepts in Family Nursing	3 credits			
NRSNG 430 - Healthcare from the Patient's Perspective	3 credits			

Total: 14

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 436 - A Population Perspective	4 credits			
NRSNG 407 - Integrated Health Assessment	3 credits			
NRSNG 450W - Global Health, Healthcare Policy and Finance	3 credits			
NRSNG 499 - Leading and Managing: Capstone Experience	6 credits			

Total: 16

Minimum credits for a B.S. degree in Nursing: 120

Notes:

Student ID: _____
 Student Name: _____
 Adviser Name: _____

Catalog: 2024-2025 Catalog
 Program: Nursing (Pre-Licensure), B.S.
 Minimum Credits Required: _____

Nursing (Pre-Licensure), B.S.

Freshman

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 201/202 - Anatomy & Physiology I	4 credits			
M 121 - College Algebra - OR -	3 credits			
M 140 - College Math for Healthcare	3 credits			
NUTR 258 - Fundamentals of Nutrition	2 credits			
PSYX 100 - Introduction to Psychology	3 credits			
WRIT 121 - Introduction To Technical Writing -OR-	3 credits			
WRIT 101 - College Writing I	3 credits			

Total: 15

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 211/212 - Anatomy & Physiology II	4 credits			
SOCI 101 - Introduction to Sociology	3 credits			
PSYX 230 - Developmental Psychology	3 credits			
CHMY 121 - Introduction to General Chemistry OR CHMY 141- College Chemistry I	3 credits			
NRSG 107 - Perspectives in Professional Nursing	2 credits			
CHMY 122 - Introduction to General Chemistry Lab -OR-	1 credit			
CHMY 142 - College Chemistry Laboratory I	1 credit			

Total: 16

Sophomore

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOM 250 - Microbiology for Health Sciences	3 credits			
BIOM 251 - Microbiology for Health Sciences Lab	1 credit			
Humanities & Fine Arts Elective 3 credits				
STAT 216 - Introduction to Statistics -OR-	3 credits			
STAT 131 - Introduction to Biostatistics	3 credits			
HCI 316 - Health Care Ethics & Regulations -OR-	3 credits			
PHL 325W - Professional Ethics	3 credits			
WRIT 322W - Advanced Business Writing -OR-	3 credits			
WRIT 201 - College Writing II	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 230 - Nursing Pharmacology	3 credits			
NRSNG 210 - Foundations of Professional Nursing	4 credits			
NRSNG 215 - Assessment and Health Promotion	3 credits			
NRSNG 256 - Pathophysiology	3 credits			

Total: 13

Junior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 308 - Nursing for Healthy Aging	3 credits			
NRSNG 312 - Mgmt of Adults with Common Health Alterations	7 credits			
NRSNG 315 - Evidence Based Practice	3 credits			
NRSNG 320 - Nursing Informatics	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 330 - Mental Health Nursing	4 credits			
NRSNG 313 - Mgmt of the Adult with Complex Health Alterations	4 credits			
NRSNG 340 - Transitional Care	3 credits			
NRSNG 351 - Advanced Nursing Concepts and Clinical Judgment	3 credits			

Total: 14

Senior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 405 - Pediatrics Nursing	4 credits			
NRSNG 415 - Nursing Care of the Childbearing Family	4 credits			
NRSNG 410 - U.S. Health Systems: Policy, Economics and Advocacy	3 credits			
NRSNG 430 - Healthcare from the Patient's Perspective	3 credits			

Total: 14

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 436 - A Population Perspective	4 credits			
NRSNG 407 - Integrated Health Assessment	3 credits			
NRSNG 450W - Global Health: Policy, Finance and Nursing Care	3 credits			
NRSNG 499 - Leading and Managing: Capstone Experience	6 credits			

Total: 16

Minimum credits for a B.S. degree in Nursing: 120

Notes:

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 fewer.
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 March 26, 2024

Dept. Nursing

Program Nursing

College CLSPS

CRC Representative Laurie Noel/Charie Faught

Description of Request: _____

Update Pre-Nursing CHMY

Current Course or Program Information: _____

see below

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
	Add to worksheet CHMY 121 Intro to General Chemistry OR CHMY 141 College Chemistry I		
	Current worksheet has just CHMY 121		

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

Students who transfer to Montana Tech or who change majors often have CHMY 141 instead of 121. Adding an OR to the worksheet will eliminate the need to have course substitutions, which is the current practice.

Anticipated Impacts to “Other” Programs

None- already a standard practice

Impact on Library: none 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): Fall 2024

APPROVALS

Department Head Approval

Date 03-26-2024

Janet Richards Coe

Dean Approval

Date 3/27/24

Katie Hawler

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Student ID: _____
 Student Name: _____
 Adviser Name: _____

Catalog: 2023-2024 Catalog
 Program: Nursing (Pre-Licensure), B.S.
 Minimum Credits Required: _____

Nursing (Pre-Licensure), B.S.

Freshman

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 201/202 - Anatomy & Physiology I	4 credits			
M 121 - College Algebra	3 credits			
- OR -				
M 140 - College Math for Healthcare	3 credits			
NUTR 258 - Fundamentals of Nutrition	2 credits			
PSYX 100 - Introduction to Psychology	3 credits			
WRIT 121 - Introduction To Technical Writing	3 credits			
-OR-				
WRIT 101 - College Writing I	3 credits			

Total: 15

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 211/212 - Anatomy & Physiology II	4 credits			
SOCI 101 - Introduction to Sociology	3 credits			
PSYX 230 - Developmental Psychology	3 credits			
CHMY 121 - Introduction to General Chemistry	3 credits			
NRSG 107 - Perspectives in Professional Nursing	2 credits			
CHMY 122 - Introduction to General Chemistry Lab	1 credit			
-OR-				
CHMY 142 - College Chemistry Laboratory I	1 credit			

Total: 16

Sophomore

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOM 250 - Microbiology for Health Sciences	3 credits			
BIOM 251 - Microbiology for Health Sciences Lab	1 credit			
Humanities & Fine Arts Elective 3 credits				
STAT 216 - Introduction to Statistics	3 credits			
-OR-				
STAT 131 - Introduction to Biostatistics	3 credits			
HCI 316 - Health Care Ethics & Regulations	3 credits			
-OR-				
PHL 325W - Professional Ethics	3 credits			
WRIT 322W - Advanced Business Writing	3 credits			
-OR-				
WRIT 201 - College Writing II	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 230 - Nursing Pharmacology	3 credits			
NRSNG 210 - Foundations of Professional Nursing	4 credits			
NRSNG 215 - Assessment and Health Promotion	3 credits			
NRSNG 256 - Pathophysiology	3 credits			

Total: 13

Junior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 308 - Nursing for Healthy Aging	3 credits			
NRSNG 312 - Mgmt of Adults with Common Health Alterations	7 credits			
NRSNG 315 - Evidence Based Practice	3 credits			
NRSNG 320 - Nursing Informatics	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 330 - Mental Health Nursing	4 credits			
NRSNG 313 - Mgmt of the Adult with Complex Health Alterations	4 credits			
NRSNG 340 - Transitional Care	3 credits			
NRSNG 351 - Advanced Nursing Concepts and Clinical Judgment	3 credits			

Total: 14

Senior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 405 - Pediatrics Nursing	4 credits			
NRSNG 415 - Nursing Care of the Childbearing Family	4 credits			
NRSNG 425 - Concepts in Family Nursing	3 credits			
NRSNG 430 - Healthcare from the Patient's Perspective	3 credits			

Total: 14

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 436 - A Population Perspective	4 credits			
NRSNG 407 - Integrated Health Assessment	3 credits			
NRSNG 450W - Global Health, Healthcare Policy and Finance	3 credits			
NRSNG 499 - Leading and Managing: Capstone Experience	6 credits			

Total: 16

Minimum credits for a B.S. degree in Nursing: 120

Notes:

Student ID: _____
 Student Name: _____
 Adviser Name: _____

Catalog: 2024-2025 Catalog
 Program: Nursing (Pre-Licensure), B.S.
 Minimum Credits Required: _____

Nursing (Pre-Licensure), B.S.

Freshman

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 201/202 - Anatomy & Physiology I	4 credits			
M 121 - College Algebra	3 credits			
- OR -				
M 140 - College Math for Healthcare	3 credits			
NUTR 258 - Fundamentals of Nutrition	2 credits			
PSYX 100 - Introduction to Psychology	3 credits			
WRIT 121 - Introduction To Technical Writing	3 credits			
-OR-				
WRIT 101 - College Writing I	3 credits			

Total: 15

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOH 211/212 - Anatomy & Physiology II	4 credits			
SOCI 101 - Introduction to Sociology	3 credits			
PSYX 230 - Developmental Psychology	3 credits			
CHMY 121 - Introduction to General Chemistry OR	3 credits			
CHMY 141- College Chemistry I	3 credits			
NRSG 107 - Perspectives in Professional Nursing	2 credits			
CHMY 122 - Introduction to General Chemistry Lab	1 credit			
-OR-				
CHMY 142 - College Chemistry Laboratory I	1 credit			

Total: 16

Sophomore

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
BIOM 250 - Microbiology for Health Sciences	3 credits			
BIOM 251 - Microbiology for Health Sciences Lab	1 credit			
Humanities & Fine Arts Elective 3 credits				
STAT 216 - Introduction to Statistics	3 credits			
-OR-				
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HCI 316 - Health Care Ethics & Regulations	3 credits			
-OR-				
PHL 325W - Professional Ethics	3 credits			
WRIT 322W - Advanced Business Writing	3 credits			
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WRIT 201 - College Writing II	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 230 - Nursing Pharmacology	3 credits			
NRSNG 210 - Foundations of Professional Nursing	4 credits			
NRSNG 215 - Assessment and Health Promotion	3 credits			
NRSNG 256 - Pathophysiology	3 credits			

Total: 13

Junior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 308 - Nursing for Healthy Aging	3 credits			
NRSNG 312 - Mgmt of Adults with Common Health Alterations	7 credits			
NRSNG 315 - Evidence Based Practice	3 credits			
NRSNG 320 - Nursing Informatics	3 credits			

Total: 16

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 330 - Mental Health Nursing	4 credits			
NRSNG 313 - Mgmt of the Adult with Complex Health Alterations	4 credits			
NRSNG 340 - Transitional Care	3 credits			
NRSNG 351 - Advanced Nursing Concepts and Clinical Judgment	3 credits			

Total: 14

Senior

Fall Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 405 - Pediatrics Nursing	4 credits			
NRSNG 415 - Nursing Care of the Childbearing Family	4 credits			
NRSNG 410 - U.S. Health Systems: Policy, Economics and Advocacy	3 credits			
NRSNG 430 - Healthcare from the Patient's Perspective	3 credits			

Total: 14

Spring Semester

Course Name	Credits	Term Taken	Grade	Gen Ed
NRSNG 436 - A Population Perspective	4 credits			
NRSNG 407 - Integrated Health Assessment	3 credits			
NRSNG 450W - Global Health: Policy, Finance and Nursing Care	3 credits			
NRSNG 499 - Leading and Managing: Capstone Experience	6 credits			

Total: 16

Minimum credits for a B.S. degree in Nursing: 120

Notes:

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 CEN 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 April 4, 2024

Dept. Nursing

College CLSPS

Program BSN Post-Licensure Program

CRC Representative Lori Noel

Description of Request: _____

The Sherry Lesar School of Nursing at Montana Technological University requests to place the BSN Post-Licensure Program into moratorium.

Current Course or Program Information: _____

The BSN Post-Licensure Program is a one year, 33 credit online program. It is designed for the Registered Nurse who has an Associate Degree in Nursing (ADN or ASN). Following completion of the BSN Post-Licensure Program, the student is awarded a Bachelors of Science Degree in Nursing (NSM)>

Number (Assigned By CRC): _____

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

The BSN Post-Licensure Program was on hold for the academic years of 2021/2022 and 2022/2023. The program required a minimum of 10 students. There has been a significant lack of interest in the program and no applications were received in the 2021/2022 or 2022/2023 academic years.

Anticipated Impacts to “Other” Programs

None

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): January 1, 2025

MontanaTech

Curriculum Change Request Form Dated August 15, 2020

APPROVALS

Department Head Approval

Date 04-15-2024

Janet Richards Coe

Dean Approval

Date 4/16/24

Katie Hailer

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date 4/22/24

[Signature]

Chancellor Approval (see below)

Date 4/22/24

[Signature]

Montana University System
PROGRAM TERMINATION/MORATORIUM FORM

Please complete the following questionnaire prior to submission of a program for termination or placement into moratorium. Please add additional comments beneath each question where applicable.

Program Title: **BSN Post-Licensure Program**

Program is being **Placed into moratorium** **Terminated**

1. **Are there currently students enrolled in the program? (If yes, please answer questions a - c below.)** Y: N:

a.) **Have all students currently enrolled in the program been met with and informed of the impending termination/moratorium?** Y: N:

b.) **What is the expected graduation date of all students from the program?**

c.) **Have course offerings been planned to allow for students in the program to complete the degree in a reasonable fashion?** Y: N:

2. **Will any faculty layoffs or changes in working conditions occur because of the termination/moratorium? (If yes, please answer questions a - b below.)** Y: N:

a.) **Have the faculty affected by the program termination/moratorium been notified?** Y: N:

Montana University System
PROGRAM TERMINATION/MORATORIUM FORM

b.) Please describe any layoffs that will occur including the date expected?

3. The following parties, where applicable, have been notified of the impending program termination/moratorium. (Please mark X for completed, NA for not applicable):

a.) Internal Curriculum Committees In progress

b.) Faculty Senate In progress

c.) Program Public Advisory Committee 04/08/2024

d.) Articulation Partners In progress

4. Has there been any negative feedback received from students, faculty, or other constituents regarding the impending termination/moratorium? (If yes, please explain below.) Y: _____ N: X

Montana Board of Regents
ACADEMIC PROPOSAL REQUEST FORM

SUBMISSION MONTH/YEAR

ITEM XXX-XXXX

ITEM TITLE

Institution: Montana Technological University

CIP Code: _____

Program/Center/Institute Title: BSN Post-Licensure Program

Includes (please specify below): Face-to-face Offering: _____ Online Offering: X Blended Offering: _____

Options: _____

Proposal Summary [360 words maximum]

What: The Sherry Lesar School of Nursing at Montana Technological University requests to place the BSN Post-Licensure Program into moratorium.

Why: The BSN Post-Licensure Program was placed on hold for the academic years of 2021/2022 and 2022/2023. The program requires a minimum of 10 students. There was a significant lack of interest in the program and no applications were received during the 2021-2022 or 2022/2023 academic years.

Resources: The BSN Post-Licensure Program was online. Courses were instructed on a faculty overload and adjunct model. Currently, the Sherry Lesar School of Nursing does not have available faculty to instruct the courses.

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

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

 1b. Withdrawing a postsecondary educational program from moratorium

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

Montana Board of Regents
ACADEMIC PROPOSAL REQUEST FORM

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)

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 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 fewer.
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 4/15/2024

Dept. Env. Eng.

College LCME

Program Env.Eng.

CRC Representative Dr. Choi

Description of Request: _____

Changing the required credits from 136 to 128 to graduate in Environmental Engineering degree. The changes made are summarised in the additional page attached

Current Course or Program Information: _____

Only one existing course will have major change to course content (EENV 415, Remote sensing and AI application in Env. Eng.),

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
<p>The new curriculum sheet with 128 credits identifies the proposed changes by yellow stripes. A summary page is attached to illustrate the changes made to the existing curriculum to arrive at 128 credits from the current 136 credits. The change in catalogue verbage is also attached for the courses that changed its course name in the requested new curriculum.</p> <p>EENV 404 "Sustainable water quality", current name is "surface water quality" EENV 425 "Systems approach to industrial ecology", current name is "industrial ecology" EENV 403 "Climate reillient water & waste water treatment", current name is "Water& waste water treatment" EENV 430 " Sustainable remediation of soil and subsurface", current name is " Soil and subsurface remediation" EENV 460 "Innovative energy for planet sustainability", current name is " Energy & suatinability"</p> <p>The course description for all these courses that goes into catalogue is attached</p> <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

The new curriculum will meet the ABET requirements and therefore, the accreditation of degree program in the future will have no problem.

Anticipated Impacts to “Other” Programs

Civil Engineering students now can take the water and waster treatment course without taking the EENV 204 course

Impact on Library: No impact has consulted with Scott 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): Fall 2024

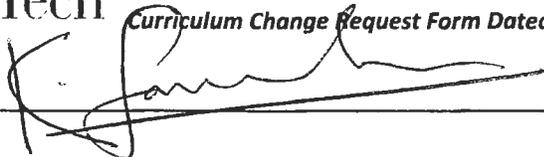
MontanaTech

Curriculum Change Request Form Dated December 23, 2022

APPROVALS

Department Head Approval

Date 4/15/2024



Dean Approval

Date 4/15/2024



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Summary of Changes to Environmental Engineering Curriculum:

Required credits to graduate is reduced from 136 to 128

Dear Colleagues, please review the revised curriculum for the Environmental Engineering program. The total credits were reduced from 136 to 128 without sacrificing any major engineering course content. One credit from reducing EENV 106 course "introduction to Env Eng" to one credit from the original 2 credits, one credit by reducing the EENV 313 course "Air Diffusion Modeling" to two credits from its original 3 credits. One credit from EENV 455, "Systems Approach to Industrial Ecology" reducing to two credits from its original 3 credits. The other five credits are gained from PHYX courses that are not included in the new curriculum. A one credit Environmental Engineering seminar course (EENV 494) is replaced by EENV 488, "FE Review for Environmental Engineers" course with one credit. For EENV 403 Climate resilient water & waste water treatment, the prerequisite of EENV 204 will be removed to accommodate the civil engineering students. The first week of class will introduce needed chemical processes to help with civil students.

EENV 106 changed from 2 credits to 1: credit reduced 1
EENV 313 changed from 3 credits to 2: credit reduced 1
EENV 425 changed from 3 credits to 2: credit reduced 1
No PHYX 236/237/238: credits reduced 5

Total credits reduced 8

Changes made to curriculum:

- 1) one new course "Remote Sensing and AI application in Environmental Engineering", this replaces the current "Land and stream restoration course" EENV414
- 2) Physics courses PHSX 237/ and the lab PHSX 238 were taken out of the revised curriculum. The PHYX 235 is an elective course now. Thus, five credits were gained by this change as explained above. Thermodynamics has been taught currently without the PHYX 2 as pre-requisite, so our students will be able to take the thermodynamics.
- 3) Biology course is changed from BIOB 101 to 160 Principles of Living Organisms, more relevant to our students
- 4) Course names changed to reflect current needs: Example, "Water and waste water treatment" is renamed as "Climate Resilient Water and Waste Water Treatment". EENV 404 is now "Sustainable water quality", EENV 425 is now "Systems Approach to Industrial Ecology", EENV 430 is renamed as "Sustainable Remediation for soil and subsurface"
- 5) One professional elective is included in the revised curriculum; this elective is new to Env. Eng. curriculum. The typical courses for electives are from Construction Management, OSH, Restoration, and Geological Engineering programs. (List of allowed courses will be provided to students)
- 6) The revised curriculum meets the ABET criteria for Environmental Engineering Program

The current curriculum is available in our web site

Date: 4-10-2024

New Revised Curriculum: Env. Eng.

Freshman

Fall Semester

- CHMY 141 - College Chemistry I *3 credits*
- CHMY 142 - College Chemistry Laboratory I *1 credit*
- M 171 - Calculus I *3 credits*
- EGEN 101 - Introduction to Engineering Calculations & Problem Solving *3 credits*
- EGEN 194 - Freshman Engineering Seminar *1 credit*
-
- WRIT 121 - Introduction to Technical Writing *3 credits*
- -OR-
- WRIT 101 - College Writing I *3 credits*

Total: 14

Spring Semester

- CHMY 143 - College Chemistry II *3 credits*
- M 172 - Calculus II *3 credits*
- PHSX 234 - General Physics-Mechanics *3 credits*
- Humanities Elective *3 credits*
- GEO 101 - Introduction to Physical Geology *3 credits*
- EENV 106 – Intro to Env. Eng., *1 credit*

Total: 16

Sophomore

Fall Semester

- EGEN 201 - Engineering Mechanics–Statics *3 credits*
- EENV 204 - Environmental Process Engineering *3 credits*
- M 273 - Multivariable Calculus *4 credits*
- Social Sciences *3 credits*
-
- EENV 242 - Environmental Sampling I *1 credit*
-
- CHMY 210 Survey of Organic Chemistry *3 credits*

Total: 17

Spring Semester

- ECNS 201or202or203 - Principles of Economics *3 credits*
- -M 274 - Introduction to Differential Equation *3 credits*
- EENV 243 - Environmental Sampling II *1 credit*
- EENV 250W - Pollution Prevention & Sustainability *3 credits*
- BIOB 160 Principles of Living Systems *3 credits*
- STAT 332 Statistics for Scientist and Engineers, *3 credits*

Total: 16

Junior

Fall Semester

- EGEN 335 - Fluid Mechanics *3 credits*
- EENV 387 - Environmental Laws & Regulations *3 credits*
- GEOE 420 - Hydrogeology for Engineers *3 credits*
- Professional Elective *3 credits*
- EENV 445 – Sustainable Waste management *3 credits*
- EENV 313 Air Diffusion Modeling, 1cr Lec. 1 cr. Lab

Total: 17

Spring Semester

- EENV 402 - Surface Water Hydrology *3 credits*
- EENV 443 - Air Pollution Control I *3 credits*
- EGEN 325 Engineering Economic Analysis, *3 credits*
- EGEN 324 - Applied Thermodynamics *3 credits*
- WRIT 321W - Advanced Technical Writing *3 credits*
- NRSM 435 - Restoration I *3 credits*
-

Total: 18

Senior

Fall Semester

-
- EENV 404 – Sustainable Water Quality 3 credits
 - EENV 415 – Remote Sensing and AI Applications in Env. Eng. 2 credit lec., 1 credit
 - EENV 444 - Air Pollution Control II 3 credits
 - EENV 489W - Environmental Engineering Design I 1 credit
 - EENV 425 – Systems Approach to Industrial Ecology 2 credits
 - EENV 403 – Climate Resilient Water & Waste Water Treatment systems 3 credits
 - Humanities 3

Total: 18

Spring Semester

-
- EENV 430 – Sustainable Remediation of Soil & Subsurface 3 credits
 - EENV 499W - Capstone: Environmental Engineering Design II 2 credits
 - EENV 421 – Management of Environmental and Human Health Risks 3 credits
 - EENV 488 – FE Review for Environmental Engineers 1 credit
 - EENV 460W – Innovative Energy for Planet Sustainability 3 credits

Total: 12

Minimum credits for a B.S. degree in Environmental Engineering: 128

Yellow: change of credit or course name change
Red: New course

[a](#)

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Environmental Engineering: Course Syllabi for renamed/revised/newcourses

1. Course Number and Name: EENV 106-Intr. To Environmental Engineering
2. Credits and Contact Hours: One credit: one-hour lectures per week; Engineering Topics
3. Course Coordinator's Name: Kumar Ganesan
4. Text Book: No text books: handouts

Specific Course Information: This course will introduce an overview of environmental engineering. Students will be introduced to air quality, water, waste water treatment, soil remediation, pollution prevention, and sustainability concepts.

Prerequisites: none: freshman

Required Course for the BS in Environmental Engineering Degree

5. Specific goals of the course: The main objective of this course is to provide students with learning experience in basics of environmental engineering in water and waste water, land and stream restoration, air pollution, drinking water systems, climate change, environmental chemistry. They are required to have a team project and a presentation at the end of the semester.

Course Outcomes: Graduates will be able to:

- (a) Understand fundamentals of environmental engineering
- (b) Understand the basic concepts of engineering design
- (c) Develop simple design projects in water supply
- (d) Understand team work and provide a technical presentation as a team.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1

ABET Student Outcome 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

6. Brief List of Topics to be Covered:

Basics of environmental engineering
Engineering design concepts
Overview of systems approach
Working on a team project

1. Course Number and Name: **EENV 313**- Air Diffusion Modeling
2. Credits and Contact Hours: Two credits, one hour lecture and three-hour lab per week;
Engineering Topics
3. Course Coordinator's Name: Kumar Ganesan
4. Text Book: No text books: class notes and handouts
5. Specific Course Information: This course introduces the fundamentals of air quality, atmospheric pollutants, its movement and transport, chemical reactions, fate of pollutants, source of pollutants, health effects of pollutants, and atmospheric dispersion of pollutants and diffusion modeling.

Prerequisites: EENV 204

Required Course for the BS in Environmental Engineering Degree

6. Specific goals of the course: The main objective of this course is to provide students with learning experience in the fundamentals of air quality to understand the sources of air pollutants, its transport in the atmosphere, fundamentals of meteorology, health effects of major pollutants, fate of pollutants, and discuss methodology to determine emission rates from different sources. The course also discusses the dispersion of pollutants in air and use EPA models to predict downwind concentrations.

Course Outcomes:

- (a) Understand concepts, terminology, and basics to understand air quality in general
- (b) Able to understand the physics of atmospheric motion and pollutant transport
- (c) Ability to understand dispersion modeling fundamentals and be able to use simple EPA dispersion models to predict downwind concentration from emission sources.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1

ABET Student Outcome 1:

“An ability to identify, formulate, and solve complex problems by applying principles of engineering, science, and mathematics.”;

7. Brief List of Topics to be Covered:

Atmospheric Dispersion, Transport, and Deposition
Atmospheric Effects
Emission Assessment
Regulation and Public Policy
Dispersion Modeling: hands on laboratory experience with simple to moderately complex dispersion modeling

1. Course Number and Name: EENV 403 – Climate Resilient Water and Wastewater Treatment
2. Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topic
3. Course Coordinator's Name: Jin Yong Choi
4. Textbook: The following textbook is recommended but not required: Water and Wastewater Engineering: Design Principles and Practice Mackenzie L. Davis McGraw-Hill Publishing, 2011. ISBN-13 9780073397863 Publisher's website: www.mhhe.com/davis1e
5. Specific Course Information: This course is an introduction to the field of water and wastewater treatment. It provides an engineering application of physical, chemical, and biological unit processes and operations for removal of impurities and pollutants. The design will include consideration of climate change and the required resiliency of systems.
Prerequisites: Senior Standing or faculty approval
Required Course for the BS in Environmental Engineering Degree
6. Specific goals of the course: At the end of this course, students will be capable of understanding the fundamental physical, chemical, and biological processes used in water and wastewater treatment, evaluating existing/proposed new water/wastewater treatment systems, as well as calculating the design parameters for different unit processes/operations employed during water and wastewater treatment.
Course Outcomes:
 - a. Understand the fundamental physical, chemical, and biological processes used in water and wastewater treatment;
 - b. Evaluating existing/proposed new water/wastewater treatment systems
 - c. Calculating the design parameters for different unit processes/operations employed during water and wastewater treatment keeping in resilient system design.

7. Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1, 2, and 4.
- a. ABET Student Outcome 1: “An ability to identify, formulate, and solve complex problems by applying principles of engineering, science, and mathematics.”;
 - b. ABET Student Outcome 2: “An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors”
 - c. ABET Student Outcome 4: “An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts”

8. Brief List of Topics to be Covered:

Drinking Water Treatment

General Introduction

Coagulation

Flocculation

Water softening

Sedimentation

Filtration

Disinfection

Wastewater

General Introduction

Preliminary treatment

Primary treatment

Secondary treatment

Nutrients Removal

1. Course Number and Name: EENV 404 Sustainable Water Quality
2. Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topics
3. Course Coordinator’s Name: Raja Nagisetty, Ph.D., P.E.
4. Text Book: Thomann, R. V.; Muller, J. A. Principles of Surface Water Quality Modeling and Control. Prentice Hall; 1 edition (January 20, 1997), ISBN-10: 0060466774 ISBN-13: 978-0060466770.

5. **Specific Course Information:** Water quality requirements for public water supplies, surface waters and wastewater discharges are discussed, and surface waters including streams, rivers, lakes, reservoirs, estuaries and oceans are covered. Point and non-point pollution sources are introduced for both conventional and priority pollutants, and receiving water impacts are assessed. The course will articulate the sustainability of water and water quality under climate change scenarios.

Prerequisites: EENV 402

Required Course for the BS in Environmental Engineering Degree

6. **Specific goals of the course:** This course strives to impart a knowledge and understanding of surface water quality problems and methods to evaluate and control these problems. To achieve this objective, conventional and toxic pollutants from point and nonpoint sources are studied, and then modeled including advection, dispersion and decay in rivers, estuaries and lakes.

Course Outcomes: Graduates will be able to: (1) model surface water quality in rivers, estuaries, and lakes, (2) understand the sources, transport and fate of conventional and toxic pollutants, (3) analyze dissolved oxygen problems, (4) analyze nutrient problems and (5) understand water quality criteria and standards.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1, 5 and 7.

ABET Student Outcome 1:

“An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.”

ABET Student Outcome 2:

“An Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors”.

7. **Brief List of Topics to be Covered:**

Introduction

Rivers and Streams

Estuaries and Bays

Lakes

Indicator Bacteria, Pathogens and Viruses

Dissolved Oxygen

Eutrophication

Sustainability

1. Course Number and Name: EENV 415: Remote Sensing and AI in Environmental Engineering
2. Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topics
3. Course Coordinator's Name: Raja Nagisetty, Ph.D., P.E.
4. Text Book: None.
5. Specific Course Information: The course will introduce students to a variety of applications of remote sensing and AI to environmental engineering problems (with special focus on land and stream restoration). Students will apply remote sensing tools and techniques for natural resources (water, air and land) monitoring and detecting changes.

Prerequisites: EENV 402.

Required Course for the BS in Environmental Engineering Degree

Specific goals of the course: The course will introduce students to a variety of applications of remote sensing and AI to environmental engineering problems.

6. Course Outcomes: At the end of the course, students will be able apply remote sensing and AI tools to solve environmental engineering problems.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 2 and 6.

ABET Student Outcome 2:

"An Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors".

ABET Student Outcome 6:

An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions."

7. Brief List of Topics to be Covered:

Drone-based remote sensing data collection and data processing

Satellite-based remote sensing data processing

ArcGIS for remote sensing data processing

Applications of Remote Sensing and AI to Land and Stream Restoration problems

Applications of Remote Sensing and AI to Air quality problems

Course number and name: EENV 415 Remote Sensing and AI Application in Env. Eng.

Credits: Three semester hours (2 Lecture and 1 lab)

Fall Semester 2020

Instructors: Raja Nagisetty, Ph.D., PE.

Office Hours: Raja Nagisetty - MWF 9.30am to 10:30am, E-mail, zoom and via phone (Office: S&E 328, 496-4448, RNagisetty@mtech.edu)

Degree Required: Yes, Required for B.S. in Environmental Engineering.

1. Course Number and Name: EENV 425 – Systems Approach to Industrial Ecology
2. Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topics
3. Course Coordinator's Name: Dr. Kumar Ganesan
4. Text Book: None.
5. Specific Course Information: Environmental design students will work in groups on real-world environmental projects obtained from the government and industry. The product of the group effort will be a design report that recommends a solution to the environmental problem.

Prerequisites: Senior standing

Required Course for the BS in Environmental Engineering Degree

6. Specific goals of the course: To provide students with a real-world, hands-on experience in an environmental engineering design project by working in project teams. Life cycle analysis and industrial ecology concepts are introduced in a robust systems approach basis.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 2 and 4.

ABET Student Outcome 2:

“An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors”

ABET Student Outcome 4:

“An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts”

7. Brief List of Topics to be Covered:

Decision analysis

Life-cycle assessment

Value opportunity analysis

Working within teams

Multi-variate analysis

Ethics and professional code of conduct for engineers

Course Number and Name: EENV 430 Sustainable Remediation of Soil and Subsurface

1 Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topics

Course Coordinator's Name: Raja Nagisetty, Ph.D., P.E.

Text Book: Practical Design Calculations for Groundwater and Soil Remediation, 2nd edition

Jeff Kuo, CRC press, 2014, ISBN-10: 1466585234.

8. Specific Course Information: A calculation-oriented course analyzing subsurface contaminant fate and transport, and applying in situ remediation technologies including soil vapor extraction, steam injection, air sparging and bioremediation in a sustainable manner.

Prerequisites: EENV 443, CHMY 210; GEOE 420.

Required Course for the BS in Environmental Engineering Degree

Specific goals of the course: To present the most commonly used methods and technologies for soil and subsurface remediation. The course includes the concept of sustainable approach for long term remediation techniques and technologies.

9. Course Outcomes: At the end of the course, students will understand the basic science and engineering concepts and be able to make typical calculations for: (1) site characterization, (2) remedial investigation, (3) plume migration in soils and vadose zone, (4) plume migration in groundwater, (5) vadose zone soil remediation and (6) groundwater remediation.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1, 2 and 6.

ABET Student Outcome 1:

"An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics."

ABET Student Outcome 2:

"An Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors".

ABET Student Outcome 6:

An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions."

10. Brief List of Topics to be Covered:

Site characterization and remedial investigation

Plume migration in groundwater and soil

Vadose zone soil remediation

Groundwater remediation

1. Course Number and Name: EENV 445 – Sustainable Waste Management
2. Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topics
3. Course Coordinator's Name: Dr. Robin Bullock
4. Text Book: Text book not required. Students are provided with course material handouts.
5. Specific Course Information: Examines the engineering principles of waste including hazardous wastes generation, handling, collection, transport, processing, recovery, and disposal. The design of RCRA & other governmental agency approved facilities will be covered. The sustainability concepts of waste management will be included in the course.

Prerequisites: Open to undergraduate students in the 3rd or final year and EENV 204 Environmental Process Engineering EENV 402

Required Course for the BS in Environmental Engineering Degree

6. Specific goals of the course: The students will learn how the generation, handling, collection, and transport of hazardous wastes are governed by laws and regulations, do the basics of hazardous waste processing and recovery, and understand RCRA and other government agency approved facilities for hazardous waste disposal in a project-based setting.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 2.

ABET Student Outcome 2:

“An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors”

7. Brief List of Topics to be Covered:

Generation: Hazardous wastes regulations

Handling: Hazardous waste handling regulations

Collection and transport: Hazardous waste collection and transport regulations

Processing: Hazardous materials characteristics

Disposal: Hazardous waste disposal; landfills

Disposal: evapotranspiration covers

1. Course Number and Name: EENV 460 – Innovative Energy for Planet Sustainability
2. Credits and Contact Hours: Three credits and three one-hour lectures per week; Engineering Topic
3. Course Coordinator's Name: Kumar Ganesan
4. Textbook: None. Lecture slides, reading, and assignments will be posted on Moodle
5. Specific Course Information: The course involves the principles of energy production, the chemistry and technologies involved, and the resources required. The course analyzes the engineering principles, the energy policy, energy conversion technologies of traditional and renewable energy production. The sustainability aspect will discuss life cycle analysis of energy production and evaluate the methods to quantify environmental and community benefits in a more realistic manner.
Prerequisites: EENV 443 Air Pollution Control or Consent of faculty
Required Course for the BS in Environmental Engineering Degree
6. Specific goals of the course: The course includes discussions on safety, cost, community acceptance, and alternative solutions including pollution prevention approaches. Upon the completion of this course, the student should be able to: (1) understand and critically evaluate long-term energy considerations within engineering designs, (2) understand the concept of sustainability and apply relevant metrics, and (3) understand the concepts, terminology, calculations and engineering design associated with renewable energy technologies.
Course Outcomes:
 - a. Understand and critically evaluate long-term energy considerations within engineering designs
 - b. Understand the concept of sustainability and apply relevant metrics
 - c. Understand the concepts, terminology, calculations and engineering design associated with renewable energy technologies
7. Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1, 2, 3, and 4.
 - a. ABET Student Outcome 1: "An ability to identify, formulate, and solve complex problems by applying principles of engineering, science, and mathematics.";
 - b. ABET Student Outcome 2: "An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors";
 - c. ABET Student Outcome 3: "An ability to communicate effectively with a range of audiences";

- d. ABET Student Outcome 4: “An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

8. Brief List of Topics to be Covered:

- a. Core Concepts of Energy and Sustainability
 - i. Energy quantification
 - ii. Thermodynamics/Energy transfer
 - iii. Energy efficiency
 - iv. Renewable/non-renewable energy
 - v. Issues associated with sustainability/environment/society/economy
- b. Fundamental Sustainability Considerations
 - i. Global efforts to tackle climate change
 - ii. Externalities/carbon tax, carbon/ecological footprint
 - iii. Sustainable growth/quality of life/Social and environmental justice
- c. Critical Thinking, Standards, and Sustainable Engineering Design
 - i. Critical thinking / life cycle analysis
 - ii. Metrics and standards
 - iii. Energy/resource related technologies and engineering design

11. Course Number and Name: **EENV 488: FE REVIEW FOR ENVIRONMENTAL ENGINEERS**

12. Credits and Contact Hours: One credit and one-hour lectures per week; Engineering Topics

13. Course Coordinator’s Name: Raja Nagisetty, Ph.D., P.E.

14. Text Book: None.

15. Specific Course Information: The course covers the following subjects in the Environmental Engineering Fundamentals of Engineering Exam – Environmental Science and Chemistry (including corrosion), Risk Assessment, Fluid Mechanics, Water Resources, Water and Wastewater Engineering, Air Quality Engineering, Solid and Hazardous Waste Engineering, and Groundwater and Soils.

Prerequisites: Preferred senior standing.

Required Course for the BS in Environmental Engineering Degree

Specific goals of the course: To review material that is covered in the Environmental Engineering section of the Fundamentals of Engineering Exam.

16. Course Outcomes: At the end of the course, students would have gained experience solving FE exam problems and be prepared for the NCEES FE exam.

Relationship to ABET Student Outcomes: The completion of this course will provide educational experience to students with full or part of ABET Student Outcomes 1.

ABET Student Outcome 1:

“An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.”

17. Brief List of Topics to be Covered: Environmental Science and Chemistry (including corrosion), Risk Assessment, Fluid Mechanics, Water Resources, Water and Wastewater Engineering, Air Quality Engineering, Solid and Hazardous Waste Engineering, and Groundwater and Soils.

[ARCHIVED CATALOG]

Environmental Engineering, B.S.

Freshman

Fall Semester

- [CHMY 141 - College Chemistry I](#) 3 credits
- [CHMY 142 - College Chemistry Laboratory I](#) 1 credit
- [M 171 - Calculus I](#) 3 credits
- [EGEN 101 - Introduction Engineering Calculations & Problem Solving](#) 3 credits
- [Humanities Elective](#) 3 credits
- [EGEN 194 - Freshman Engineering Seminar](#) 1 credit

- [WRIT 121 - Introduction To Technical Writing](#) 3 credits
- OR-
- [WRIT 101 - College Writing I](#) 3 credits

Total: 17

Spring Semester

- [CHMY 143 - College Chemistry II](#) 3 credits
- [M 172 - Calculus II](#) 3 credits
- [PHSX 234 - General Physics-Mechanics](#) 3 credits
- [Humanities Elective](#) 3 credits
- [GEO 101 - Introduction to Physical Geology](#) 3 credits
- [EENV 106 - Environmental Software](#) 2 credits

Total: 17

Sophomore

Fall Semester

- [EGEN 201 - Engineering Mechanics-Statics](#) 3 credits
- [EENV 204 - Environmental Process Engineering](#) 3 credits
- [M 273 - Multivariable Calculus](#) 4 credits

Fall Semester

- [EENV 404 - Surface Water Quality](#) 3 credits
- [EENV 414 - Land & Stream Restoration](#) 3 credits
- [EENV 444 - Air Pollution Control II](#) 3 credits
- [EENV 489W - Environmental Engineering Design I](#) 1 credit
- [NRSM 435 - Restoration I](#) 3 credits
- [EENV 425 - Industrial Ecology](#) 3 credits

Total: 16

Spring Semester

- [EENV 430 - Soil & Subsurface Remediation](#) 3 credits
- [EENV 499W - Capstone: Environmental Engineering Design II](#) 2 credits
- [EENV 421 - Risk Analysis & Toxicology](#) 3 credits
- [EENV 494 - Seminar: Environmental Engineering](#) 1 credit
- [EENV 460W - Energy & Sustainability](#) 3 credits
- [EENV 403 - Water & Waste Water Treatment](#) 3 credits

Total: 15

Minimum credits for a B.S. degree in Environmental Engineering: 136

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 fewer.
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 April 9, 2024

Dept. Freshman Engineering

Program Freshman Engineering

College Lance College of Mines & Engineering

CRC Representative Roos

Description of Request: _____

Update course descriptions and pre/co-reqs for EGEN 100, 101, 194

Current Course or Program Information: _____

EGEN 101/194 are the introductory courses in most of our engineering programs, EGEN 100 was originally created as FESP 095 to prepare students to enter the engineering programs.

Number (Assigned By CRC): EGEN 100, 101, 194

Proposed Change

Course #	Name	Credits	Pre-req.
EGEN 100	Engineering & Science Fundamentals	3 credits (2 lec, 3 lab)	None
<p>This course is intended for students who are not yet ready for M 151 – Precalculus but pursuing an engineering curriculum. The course focuses on developing a sound foundation that students will build upon in later engineering courses. Skills such as dimensional analysis, unit conversion, problem solving skills and strategies, technical writing, and technical drawing are introduced. Also, a crucial goal of this class is to bridge the gap between math and applied, real-world science/engineering applications. Topics from physics, chemistry, engineering, and algebra are combined into a lecture and lab curriculum. Students will learn data collection through experimentation, data analysis, and data interpretation and will be introduced to Microsoft Excel. Course generally offered fall semester.</p>			
EGEN 101	Introduction to Engineering Calculations & Problem Solving	3 credits (2 lec, 3 lab)	Pre-Req: EGEN 100 OR Co-Req: M 151 OR M 171
<p>This course focuses on developing problem solving and calculation skills that students need to succeed in their engineering fundamental courses and career. Engineering fundamentals, such as force, acceleration, density, temperature, pressure, and energy, are introduced to expose students to various problem-solving strategies. Students are taught how to solve and communicate engineering problems and leverage computer software such as spreadsheets, graphics programs, and database programs. In addition, an introduction to engineering design is presented and a small group-based design project completed. Course generally offered both semesters.</p>			
EGEN 194	First-Year Engineering Seminar	1 credit (1 lec)	Pre or Co-Req: EGEN 100 OR EGEN 101 OR CSCI 135
<p>The course focuses on Engineering careers and employment in the fields of engineering offered at Montana Tech by bringing in guest presenters employed in those area and by offering open houses for the various engineering disciplines, and related programs. Students are introduced to career services and are required to register and attend career fairs. Also covered are various study skills to help improve success for beginning engineering students. Course generally offered fall semester.</p>			
<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

Changes to the first-year courses have occurred with changes in faculty and responsibilities, this request is intended to update the descriptions to align with the courses as currently taught. Pre/Co-requisites for these courses have been updated over time and this is an attempt to focus on what is required to be successful in subsequent courses rather than forcing a sequence.

Anticipated Impacts to “Other” Programs

These courses will be more accessible to other programs (such as CS/SE). These changes were made with input from the Executive Director of Student Success & First-Year Engineering Advisor to best prepare students while expanding course possibilities.

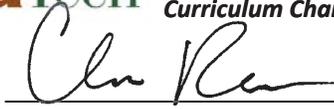
Impact on Library: Not Required _____ has consulted with _____ at the Montana Tech library to ensure needed materials and media are available. (Or No consultation is required since changes are only in the course number, course name, or course pre-requisites.)

Date to take effect (note that the earliest date is the next calendar year): Fall 2024 _____

APPROVALS

Department Head Approval

Date 4/16/24



Dean Approval

Date 4/16/24



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

EGEN 100 - Engineering & Science Fundamentals

3 credits (Hrs: 2 Lec., 3 Lab)

This course will focus on the skills that are necessary to successfully enter the First-Year Engineering Program at Montana Tech.

This course is intended for students who are not yet ready for M 151 – Precalculus but pursuing an engineering curriculum.

The course focuses on developing a sound foundation that students will build upon in later engineering courses. Skills such as These skills include dimensional analysis, unit conversion, problem solving skills and strategies, technical writing, and technical drawing are introduced. Also, a crucial goal of this class is to bridge the gap between math and applied, real-world science/engineering applications. Topics from physics, chemistry, engineering, and algebra are combined into a lecture and lab curriculum. Students will learn data collection through experimentation, data analysis, and data interpretation and will be introduced to Microsoft Excel.

Course generally offered fall semester.

EGEN 101 - Introduction to Engineering Calculations & Problem Solving

3 credits (Hrs: 2 Lec., 3 Lab)

This course focuses on developing problem solving and calculation skills that students need to succeed in their engineering fundamental courses and career. Engineering fundamentals, such as force, acceleration, density, temperature, pressure, and energy, are introduced to expose students to various problem-solving strategies. An introduction to engineering calculations and problem solving using the computer. Students are taught how to solve and communicate engineering problems and leverage computer software such as spreadsheets, graphics programs, and database programs. In addition, an introduction to engineering design is presented and a small group-based design project completed.

Pre-requisite: EGEN 100 OR Co-requisite(s): M 151 OR 171. Course generally offered both semesters.

EGEN 194 - Freshman First-Year Engineering Seminar

1 credit (Hrs: 1 Lec.)

The first in a three course series for freshman engineering students. The course focuses on Engineering careers and employment in the fields of engineering offered at Montana Tech by bringing in guest presenters employed in those area and by offering open houses for the various engineering disciplines, and related programs. Students are introduced to career services and are required to register and attend career fairs. Also covered are various study skills to help improve success for beginning engineering students.

Pre-requisite: M 151. Pre or Co-requisite: EGEN 100 OR EGEN 101 OR CSCI 135 (1st & 2nd)

SYLLABUS

EGEN 100 – Engineering & Science Fundamentals

Fall 2024 • Main 103 / Main 205 • Mo/We 12:00 - 12:50 pm & Th 2:00-4:50 pm

CRN 76547 • 3 credits (2 lectures and 3-hour lab per week)

Students must also register for the required EGEN 100 lab section.

Montana Technological University • Lance College of Mines & Engineering

Instructor

Chris Roos, M.S., P.E.

Assistant Professor

Office: 118, Mining Geology Building

Phone: (406) 496-4624

Email: croos@mtech.edu

Office hours: By appointment, and open door when available

Course Description

This course is intended for students who are not yet ready for M 151 – Precalculus but pursuing an engineering curriculum.

The course focuses on developing a sound foundation that students will build upon in later engineering courses. Skills such as dimensional analysis, unit conversion, problem solving skills and strategies, technical writing, and technical drawing are introduced. Also, a crucial goal of this class is to bridge the gap between math and applied, real-world science/engineering applications. Topics from physics, chemistry, engineering, and algebra are combined into a lecture and lab curriculum. Students will learn data collection through experimentation, data analysis, and data interpretation and will be introduced to Microsoft Excel.

Course Outcomes

Students completing this class will be able to solve and analyze engineering problems using:

- Critical thinking and problem-solving skills including dimensional analysis and unit conversions
- Basic Physics
- Basic Chemistry

Course Components

Moodle – This course will be facilitated through our Moodle website <http://my.mtech.edu/>

All of the course material including laboratory and assignment handouts will be posted in our Moodle lecture class site. Announcements will also be sent through our Moodle site to your Montana Tech email account.

Required Calculator – FE approved calculator <https://ncees.org/exams/calculator/>

Textbook – None

Homework – Homework will be assigned on a regular basis either in class or from Moodle. You will submit your homework in Moodle. All handwritten homework must be completed on engineering paper and scanned into a .pdf file and uploaded to Moodle.

Labs – You must attend your scheduled lab section to receive credit for laboratory assignments. There will be no switching of lab sections unless it is done through enrollment services. Laboratory

and Design project assignments should be submitted as an assignment through your Moodle EGEN 100 laboratory section.

Quizzes – There will be quizzes assigned throughout the semester to assess your retention of the course material and homework assignments. Quizzes may be in-class or assigned in Moodle. It will be the student's responsibility to check Moodle regularly for quizzes.

Tests – There will be one final examination in the lecture section. The exam will take place during the scheduled final exam time – **TBD**

Anything said by the instructor, guest speakers, or other people giving presentations in class, as well as anything in the reading assignments not specifically discussed in class is fair game for questions on exams. There will be no make-up exams given unless arranged for with the instructor in writing **before the exam is given**. There will be no exceptions to this rule. If an exam or quiz is given on-line it is your responsibility to pre-arrange access to an internet-connected computer in a location that meets all on-line testing requirements.

Late Assignments – Late assignments (labs, homework, quizzes, etc.) will **NOT** be accepted and you will receive a zero for the assignment unless prior arrangements are made in **writing** or you have missed for a school sponsored activity. That means that you must have an e-mail from me stating that you will be allowed to turn in the assignment late.

Grading

Your grade will depend on attendance and your performance on labs, homework, quizzes, midterm exams, and the final exam. The weights are as follows and are subject to change:

Quizzes	5%
Homework	30%
Labs	30%
Lecture Final	20%
Attendance	15%

A: 90–100% | **B:** 80–89% | **C:** 70–79% | **D:** 60–69% | **F:** < 60%

Note: With the size of this course, I may switch to the “standard” +/- system.

Student Conduct

<https://www.mtech.edu/student-conduct/index.html>

Since you have made it this far in your academic pursuits, I assume you aspire to a professional career. As an engineer you will be expected to lead people and manage resources, and your personal integrity will be an integral component of how you conduct yourself in this profession.

Academic Integrity: Montana Tech believes that **academic honesty and integrity** are fundamental to higher education. Cheating can result in losing at least one letter grade for the course (e.g., from a C to a D), a failing grade for the entire course, and even expulsion from Montana Tech. In the way you conduct yourself as a student, you are training yourself for the type of professional you will be.

Title IX: Title IX violations include sexual assault, harassment, dating and relationship violence, discrimination, stalking, and retaliation. **Montana Tech is committed to providing an environment that emphasizes the dignity and worth of every member of its community.** To report a violation of sexual misconduct or gender discrimination, contact the Title IX Coordinator (Vanessa Van Dyke vvandyk@mtech.edu) at (406) 496-4332.

All professors at Montana Tech are required to report any incidences to the Title IX Coordinator. Confidential support for students is available by contacting the Student Counseling Center at (406) 496-4429 (Engineering Hall, Room 103).

Students with Disabilities

Montana Tech provides reasonable accommodations to students who are registered with Disability Services. If you have any kind of disability, including, but not limited to, learning, mental, physical, cognitive, chronic or a temporary injury, contact Shauna Goodell at Disability Services to discuss your accommodations, access needs, and to obtain a letter of verification. You can reach Disability Services via email at sgoodell@mtech.edu or by phone at (406) 496-4428. The Disability Services office is in the Student Success Center, room 3.137, within the Academic Center for Excellence (ACE). All services are confidential.

Any student who may need an accommodation due to a disability, please make an appointment to see me during my office hours. A letter from a Montana Tech Disability Coordinator authorizing your accommodations is needed.

Note: This syllabus is subject to revision by the instructor at any time.

SYLLABUS

EGEN 101 – Introduction to Engineering Calculations & Problem Solving

Fall 2024 • Library Auditorium • Tu/Th 10:00 - 10:50 am
CRN 72239 • 3 credits (2 lectures and 3-hour lab per week)
Students must also register for a required EGEN 101 lab section.
Montana Technological University • Lance College of Mines & Engineering

Instructor

Chris Roos, M.S., P.E.

Assistant Professor

Office: 118, Mining Geology Building

Phone: (406) 496-4624

Email: croos@mtech.edu

Office hours: By appointment, and open door when available

Course Description

This course focuses on developing problem solving and calculation skills that students need to succeed in their engineering fundamental courses and career. Engineering fundamentals, such as force, acceleration, density, temperature, pressure, and energy, are introduced to expose students to various problem-solving strategies. Students are taught how to solve and communicate engineering problems and leverage computer software such as spreadsheets, graphics programs, and database programs. In addition, an introduction to engineering design is presented and a small group-based design project completed.

Course Objectives

To provide the student with a set of computer, analysis, and design skills to accomplish the following:

- Solve engineering problems using a computer
- Use engineering design concepts in simple design projects
- Make technical drawings for communicating designs

To provide additional career-focused information about the engineering programs at Montana Tech

Course Outcomes

Students completing this class will be able to solve and analyze engineering problems using:

- Spreadsheets (MS Excel)
- CAD Software (AutoCAD)
- Critical thinking problem solving skills
- Established engineering design principles

Course Components

Moodle – This course will be facilitated through our Moodle website <http://my.mtech.edu/>. All of the course material including laboratory and assignment handouts will be posted in our Moodle lecture class site. Announcements will also be sent through our Moodle site to your Montana Tech email account.

Required Calculator – FE approved calculator <https://ncees.org/exams/calculator/>

Textbook – *Thinking Like an Engineer 5th Ed.* (2021) Stephan, Bowman, Park, Sill, Ohland.
***Recommended but not required.**

Homework – Homework will be assigned on a regular basis either in class or from Moodle. You will submit your homework in Moodle. All handwritten homework must be completed on engineering paper and scanned into a .pdf file and uploaded to Moodle.

Labs – You must attend your scheduled lab section to receive credit for laboratory assignments. There will be no switching of lab sections unless it is done through enrollment services. Laboratory and Design project assignments should be submitted as an assignment through your Moodle EGEN 101 laboratory section.

Projects – You will be responsible for working on two projects each to be presented in your lab period. You must be in a group consisting of members that attend your assigned lab period.

Quizzes – There will be quizzes assigned throughout the semester to assess your retention of the course material and homework assignments. Quizzes may be in-class or assigned in Moodle. It will be the student's responsibility to check Moodle regularly for quizzes.

Tests – There will be one final examination in the lecture section. The exam will take place during the scheduled final exam time – **TBD**

Anything said by the instructor, guest speakers, or other people giving presentations in class, as well as anything in the reading assignments not specifically discussed in class is fair game for questions on exams. There will be no make-up exams given unless arranged for with the instructor in writing **before the exam is given**. There will be no exceptions to this rule. If an exam or quiz is given on-line it is your responsibility to pre-arrange access to an internet-connected computer in a location that meets all on-line testing requirements.

Late Assignments – Late assignments (labs, homework, quizzes, etc.) will **NOT** be accepted and you will receive a zero for the assignment unless prior arrangements are made in writing or you have missed for a school sponsored activity. That means that you must have an e-mail from me stating that you will be allowed to turn in the assignment late.

Grading

Your grade will depend on attendance and your performance on labs, homework, quizzes, midterm exams, and the final exam. The weights are as follows and are subject to change:

Quizzes	10%
Homework	15%
Projects	15%
Labs	30%
Lecture Final	25%
Attendance	5%

A: 90–100% | **B:** 80–89% | **C:** 70–79% | **D:** 60–69% | **F:** < 60%

Note: With the size of this course, I may switch to the "standard" +/- system.

Student Conduct

<https://www.mtech.edu/student-conduct/index.html>

Since you have made it this far in your academic pursuits, I assume you aspire to a professional career. As an engineer you will be expected to lead people and manage resources, and your personal integrity will be an integral component of how you conduct yourself in this profession.

Academic Integrity: Montana Tech believes that **academic honesty and integrity** are fundamental to higher education. Cheating can result in losing at least one letter grade for the course (e.g., from a C to a D), a failing grade for the entire course, and even expulsion from Montana Tech. In the way you conduct yourself as a student, you are training yourself for the type of professional you will be.

Title IX: Title IX violations include sexual assault, harassment, dating and relationship violence, discrimination, stalking, and retaliation. **Montana Tech is committed to providing an environment that emphasizes the dignity and worth of every member of its community.** To report a violation of sexual misconduct or gender discrimination, contact the Title IX Coordinator (Vanessa Van Dyke vvandyk@mtech.edu) at (406) 496-4332.

All professors at Montana Tech are required to report any incidences to the Title IX Coordinator. Confidential support for students is available by contacting the Student Counseling Center at (406) 496-4429 (Engineering Hall, Room 103).

Students with Disabilities

Montana Tech provides reasonable accommodations to students who are registered with Disability Services. If you have any kind of disability, including, but not limited to, learning, mental, physical, cognitive, chronic or a temporary injury, contact Shauna Goodell at Disability Services to discuss your accommodations, access needs, and to obtain a letter of verification. You can reach Disability Services via email at sgoodell@mtech.edu or by phone at (406) 496-4428. The Disability Services office is in the Student Success Center, room 3.137, within the Academic Center for Excellence (ACE). All services are confidential.

Any student who may need an accommodation due to a disability, please make an appointment to see me during my office hours. A letter from a Montana Tech Disability Coordinator authorizing your accommodations is needed.

Note: This syllabus is subject to revision by the instructor at any time.

SYLLABUS

EGEN 194 – First-Year Engineering Seminar

Fall 2024 • Library Auditorium • Tu/Th 1:00 - 1:50 pm
CRN 74841 • 1 credit • Pre or Co-Requisite: EGEN 100 OR EGEN 101 OR CSCI 135
Montana Technological University • Lance College of Mines & Engineering

Instructor

Chris Roos, M.S., P.E.

Assistant Professor

Office: 118, Mining Geology Building

Phone: (406) 496-4624

Email: croos@mtech.edu

Office hours: By appointment, and open door when available

Course Description

The course focuses on Engineering careers and employment in the fields of engineering offered at Montana Tech by bringing in guest presenters employed in those area and by offering open houses for the various engineering disciplines, and related programs. Students are introduced to career services and are required to register and attend career fairs. Also covered are various study skills to help improve success for beginning engineering students.

Course Objectives

To provide career-focused information about the engineering programs at Montana Tech through the venue of departmental presentations. Academic success topics will also be covered in this class.

Course Outcomes

Students will have gained enough career information to help them choose a major (engineering or otherwise) at Montana Tech. Other topics covered in this class will help students to develop strategies and habits that promote academic success.

Course Content

Departmental presentations, Open Houses, career focused assignments and academic success strategies. Departmental presentations will be held during the regular class times in the assigned class room. Students are expected to attend all of the departmental presentations. Open Houses attendance each week is mandatory.

Attendance

Class attendance is taken daily. If you are ill or there is an emergency, you must inform the instructor by email before class starts and make personal arrangements for your homework assignment to be submitted in class by the due date and time. Students with excused absences (a doctor's note) must meet with the instructor to make up missed assignments.

Course Components

Moodle – This course will be facilitated through our Moodle website <http://my.mtech.edu/>. All of the course material including laboratory and assignment handouts will be posted in our Moodle lecture class site. Announcements will also be sent through our Moodle site to your Montana Tech email account.

Textbook – None

Homework – Homework will be assigned on a regular basis either in class or from Moodle. You will submit your homework in Moodle. All handwritten homework must be completed on engineering paper and scanned into a .pdf file and uploaded to Moodle.

Late Assignments – Late assignments (labs, homework, quizzes, etc.) will **NOT** be accepted and you will receive a zero for the assignment unless prior arrangements are made in writing or you have missed for a school sponsored activity. That means that you must have an e-mail from me stating that you will be allowed to turn in the assignment late.

Grading

Your grade will depend on attendance and your performance on labs, homework, quizzes, midterm exams, and the final exam. The weights are as follows and are subject to change:

Class Attendance	40%
Open House & Department Session Attendance:	40%
Homework	20%

A: 90–100% | **B:** 80–89% | **C:** 70–79% | **D:** 60–69% | **F:** < 60%

Note: With the size of this course, I may switch to the “standard” +/- system.

Student Conduct

<https://www.mtech.edu/student-conduct/index.html>

Since you have made it this far in your academic pursuits, I assume you aspire to a professional career. As an engineer you will be expected to lead people and manage resources, and your personal integrity will be an integral component of how you conduct yourself in this profession.

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Any student who may need an accommodation due to a disability, please make an appointment to see me during my office hours. A letter from a Montana Tech Disability Coordinator authorizing your accommodations is needed.

Note: This syllabus is subject to revision by the instructor at any time.

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 fewer.
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 September xx, 2023

Dept. Metallurgical & Materials Engrg.

College Lance College of Mines & Engineering

Program M.S. Materials Science & Engrg.

CRC Representative Dr. Mario Caccia

Description of Request: _____

Amend an existing degree program (M.S. in Materials Science & Engineering) by changing the seminar requirements.

Current Course or Program Information: _____

The course requirements for the M.S. degree currently require two one-credit seminars: T.C. 5160 and ENGR 5940

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
Remove T.C.5160	Graduate Writing Seminar	-1	WRIT 321W or 322W or GRE Analytical writing score of 4.0
Remove ENGR 5940	Engineering Seminar	-1	None listed
Add MTSI 500	Survey of Materials Science & Engineering	+2 (1 cr/sem x 2 sem)	Senior or graduate student standing or instructor's consent

CATALOG INFORMATION:
 Course No. and Title: MTSI 500 - Survey of Materials Engineering
 Credits: 1 credit lecture
 Designation: Two semesters of MTSI 500 are required for the Ph.D. degree in Materials Science and for the M.S. degree in Materials Science and Engineering.
 Prerequisite: Senior or graduate student standing or instructor's consent
 Course Description: This course is offered to benefit students contemplating a career in scientific or engineering research and technical management. It offers information that many research professionals wish that they had received at the outset of their graduate educations, both to facilitate their studies and to prepare them for career success following graduation. The course will feature: 1) experimental design and project management; 2) guidance on conducting thorough literature and patent searches, properly documenting experimental data, data reduction and critical analysis, and effective presentation; 3) proposal and grant writing, publications, contracts, intellectual property, professional societies and conferences; and 4) information on potential career paths and opportunities, as well as expectations from research supervisors in universities, corporations, national laboratories, and government agencies.
 Learning outcomes: Outcomes: The course objectives and outcomes are responsive to ABET criteria 6 – develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions; 7 – an ability to acquire and apply new knowledge as needed, using appropriate learning strategies; and 3 – communicate effectively with a wide range of audiences. Upon successful completion of the course, students will:

- understand the scope and rigor of masters and Ph.D. levels of graduate research and understand the responsibilities, requirements and expectations that come with being graduate students
- comprehend the qualities and characteristics of sound researchers
- be equipped with a fundamental knowledge based on the conduct of research

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

The course was developed to enable senior level undergraduate and first year graduate students to develop an appreciation for and a deeper understanding of the aptitudes, dedication, and skills required for a successful career in research. The objective is to provide students with knowledge that they can parlay into a successful and intellectually rewarding graduate school experience and, ultimately, a rewarding career in research or technical management.

Anticipated Impacts to “Other” Programs

None, except the students will no longer be required to take ENGR 5940 or T.C. 5160.

Impact on Library: No consultation required. _____ 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): Spring 2024 _____

APPROVALS

Department Head Approval

Date 11/20/2023

Jerome P. Downey

Dean Approval

Date 11/27/23



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

MONTANA TECH
Metallurgical & Materials Engineering Department

MTSI 500 and MTSI 500W
AY 2023-24 Syllabus

Instructors: Dr. Sudhakar Vadiraja (ELC 218; 496-4267)
Dr. Jerry Downey (ELC 208A; 496-4578)

Office hours: As posted

Course Description: This course is offered to benefit students contemplating a career in scientific or engineering research and technical management. It offers information that many research professionals wish that they had received at the outset of their graduate educations, both to facilitate their studies and to prepare them for career success following graduation. The course will feature: 1) experimental design and project management; 2) guidance on conducting thorough literature and patent searches, properly documenting experimental data, data reduction and critical analysis, and effective presentation; 3) proposal and grant writing, publications, contracts, intellectual property, professional societies and conferences; and 4) information on potential career paths and opportunities, as well as expectations from research supervisors in universities, corporations, national laboratories, and government agencies.

Credits and Class Meetings: The 1-credit (lecture) course is offered during Fall and Spring semesters as MTSI 500 and MTSI 500W, respectively. MTSI 500W, includes a writing component. *Fall 2023 MTSI 500 class will meet in ELC 225 from 2:00 to 2:50 pm on Wednesdays. Spring 2024 MTSI 500W class will meet in ELC 225 from 2:00 to 2:50 pm on Tuesdays.*

Designation: A graduate-level elective course intended for first-year graduate students as well as seniors who are contemplating graduate school. Two semesters (fall and spring) are requirements in the Materials Science Ph.D. program and the Materials Science and Engineering M.S. program

Prerequisites: senior-level undergraduates or first-year graduate students in a science or engineering program.

Textbook and References: No textbook is required. However, supplemental reading will be a course component. A list of supplemental references is provided at the end of this syllabus.

Topics: the planned lecture topics include but are not limited to:

- The Great (Scientific) Conversation
- Moodle
- Proper and Safe use of laboratory tools
- Collegiality & Altruistic Behavior in Grad School
- Organization and Technical Communication
- Project Conceptualization, grant and proposal writing
- Do you have PI potential?
- Data-driven materials science approach to discover new materials
- Scientific Communication -Written and Verbal Part 1
- Scientific Communication -Written and Verbal Part 2
- Design of experiments; the role of statistics, data interpretation and analysis
- Critical thinking and analysis as applied to one's own work
- Professionalism
- How to manage research and yourself
- Importance and models of strong team work
- Intellectual property: trade secrets, patents, copyrights
- How to maintain a laboratory notebook
- Root case evaluations and decision making using KT analysis
- Technical writing part 1
- Technical writing part 2

- How to write experimental procedures
- The structure of scientific revolutions (more on history and philosophy of science)
- Abstracts and Outlining
- Organizational psychology
- Values systems and research culture
- Value proposition, voice of customer (research team) evaluations, and innovation
- The Power of a Ph.D.

The spring semester will feature different topics and speakers than the fall semester. The spring semester includes a technical writing component and the term paper will be subject to a writing assessment.

Objectives: the course was developed to enable senior level undergraduate and first year graduate students to develop an appreciation for and a deeper understanding of the aptitudes, dedication, and skills required for a successful career in research. The objective is to provide students with knowledge that they can parlay into a successful and intellectually rewarding graduate school experience and, ultimately, a rewarding career in research or technical management.

Outcomes: The course objectives and outcomes are responsive to ABET criteria 6 – develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions; 7 – an ability to acquire and apply new knowledge as needed, using appropriate learning strategies; and 3 – communicate effectively with a wide range of audiences. Upon successful completion of the course, students will:

- understand the scope and rigor of masters and Ph.D. levels of graduate research and understand the responsibilities, requirements and expectations that come with being graduate students
- comprehend the qualities and characteristics of sound researchers
- be equipped with a fundamental knowledge based on the conduct of research.

Evaluation and Grading Criteria: the course will be presented in a fast-paced, highly interactive format with emphasis on student performance and growth achieved through reading, class participation, and homework assignments. Grades are determined according to the following formula:

Term Project:	40%
HW Assignments:	30%
Class Participation:	30%

Term projects: at the end of the fall semester, students will be required to make a formal presentation; students will be required to write and submit a formal term paper at the conclusion of the spring semester. The instructors will provide details regarding these assignments during the initial class meeting each semester.

Grading scale:

A = 90 to 100	D = 60 to <70
B = 80 to <90	F = <60
C = 70 to <80	

Plus, and minus grades may be assigned at the instructors' discretion.

Attendance: Students are responsible for all subject matter assigned or discussed in class, whether or not the student chooses to attend class. Excessive absenteeism will affect the participation component of the course grading criteria.

Students must submit their assignments in advance of field trips, athletics, or other school-sanctioned events that force them to miss class. The student is responsible for notifying the instructors and submitting homework assignments prior to the absence. Students should arrange to obtain class notes from another student. Do not ask to borrow the instructor's lecture notes or grading keys.

Academic Integrity: Students are to conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession. Students are expected to fully comply with the Montana Tech Academic Honesty Policy.

If a student is determined to have cheated on a report, quiz, or examination, he or she will be dropped from the course with an “F” grade. In compliance with Montana Tech policy, cases of academic dishonesty will be reported to the Office of the Vice Chancellor for Academic Affairs.

No student is allowed to record or photograph any classroom or laboratory activity without the express written consent of the instructor. In case that a student believes that he/she needs to record or tape classroom activities due to disability, the student must request an appropriate accommodation. If such an accommodation has been arranged, the material may not be further copied, distributed, published, or otherwise used for any other purpose without the express written consent of the instructor.

Disability Accommodations:

Students in need of academic accommodation because of disabilities must:

1. Register with and provide documentation to the Montana Tech Student Disability Coordinator
2. Provide the instructor with a letter that states the need and type of accommodation. This should be done during the first week of class.

In case a student needs to record or tape classroom activities due to disability, the student must request an appropriate accommodation. If such an accommodation has been arranged, the material may not be further copied, distributed, published, or otherwise used for any other purpose without the express written consent of the instructors.

Prepared by:

J. P. Downey & S. Vadiraja
Modified to incorporate Graduate Research Council amendments

29 August 2023
9 November 2023

Recommended supplemental literature:

- T.S. Kuhn, The Structure of Scientific Revolutions
- B. Gower, Scientific Method: An historical and philosophical introduction
- C. Van Doren, A History of Knowledge: Past, present, future
- J. Burke, Connections: How inventions are linked and how they cause change throughout history.
- D.E. Stokes, Pasteur’s Quadrant: Basic science and technological innovation
- H.Schenck, An Introduction to the Engineering Research Project
- M. Palmquist, The Bedford Researcher
- M.D. Rosenau, Successful Project Management
- W.C. Booth, G.G. Colomb, and J.M. Williams, The Craft of Research
- H.G. Gauch, Scientific Method in Practice
- M.J. Anderson and P.J. Whitcomb, DOE Simplified, 2nd Edition
- S.R. Schmidt and R.G. Launsby, Understanding Industrial Designed Experiments
- R.G. Munro, Data Evaluation Theory and Practice for Materials Properties
- E.B. Wilson, An Introduction to Scientific Research
- D.F. Bloom, J.D. Karp, and N. Cohen, The Ph.D. Process: A student’s guide to graduate school in the sciences
- D.C. Van Aken and W.F. Hosford, Reporting Results: A practical guide for engineers and scientists

S.S. Carey, "A Beginner's Guide to Scientific Method," ISBN-10: 0534584500

D. Madsen, Successful Dissertations and Theses: A Guide to Graduate Student Research from Proposal to Completion, ISBN-10: 1555423892

C.M. Roberts, The Dissertation Journey: A Practical and Comprehensive Guide to Planning, Writing, and Defending Your Dissertation" ISBN-10: 1412977983

R.V. Smith, Graduate Research, University of Washington Press, ISBN-10: 029597705

Valiela, Doing Science: Design, Analysis, and Communication of Scientific Research, Oxford University Press, ISBN-10: 0195134133

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

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:
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 - Course Description
 - Syllabus
 - Curriculum Worksheet
 - Pre-requisite or co-requisite
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 - 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):
 - Modifying the requirements for the Materials Science Minor

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 March 25, 2024
Dept. Metallurgical & Materials Engineering **College** Lance College of Mines & Engineering
Program Metallurgical and Materials Engineering **CRC Representative** Mario Caccia

Description of Request: Modify the requirements for the Materials Science minor

Modify minor to reflect recent changes in M&ME curriculum, remove defunct course listings, and broaden elective choices.

Current Course or Program Information: Materials Science Minor

Current catalog information stipulates 19 total credits and offers students minimal latitude in course selection.

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
Out (as required courses):			
EMAT 354	Materials Engineering & Design Lab	1	
EMAT 362	Ceramic Materials	3	
EMAT 472	Materials Engineering & Design	2	
Proposed:			
A total of eighteen credits are required for the minor in Materials Science. The requirement is nine credits of core courses and nine credits of electives.			
Core courses:			
1. Either EMAT 251 – Materials Structure and Properties; 3 credits; Prerequisites: CHMY 141 and M 172 or EGEN 213 – Survey of Metallurgical and Materials Engineering; 3 credits; Prerequisite: CHMY 143 or consent of instructor			
2. Either EMET 307 – Metallurgical and Materials Engineering Thermodynamics; 3 credits; Prerequisite: or CHMY 373 – Thermodynamics and Kinetics; 3 credits; Prerequisites: CHMY 371 and M 172			
3. EMAT 351 – Fundamentals of Materials; 2 credits; Prerequisites: EMAT 251 or EGEN 213			
4. EMAT 353 – Microstructural Interpretation; 1 credit; Corerequisite: EMAT 351			
Electives:			
Students complete the minor by selecting nine credits of courses with the EMAT or EMET designation. It is understood that students are also responsible for passing any prerequisite courses for the required and elective courses. The elective courses will be decided in consultation with the student's academic advisor and an M&ME department faculty member.			
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

Conversations with department and external MTU faculty and students interested in the Materials Science minor prompted the department to reassess the minor. Due to the curriculum modifications effected in Fall 2023 and the fact that two of the courses listed in the current catalog are no longer available, we deemed it necessary to modify the minor by implementing the proposed changes. The proposed changes are designed to increase the attractiveness of the minor to students by providing more elective course choices.

Anticipated Impacts to "Other" Programs

The proposed change will have a negligible effect on "other" programs.

Impact on Library: M&ME Dept. Head Jerry Downey _____ has consulted with Scott Juskievicz _____ 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): January 2025 _____

APPROVALS

Department Head Approval

Date 3/27/2024

Dean Approval

Date _____

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

**PROPOSED CHANGES TO THE MATERIALS SCIENCE MINOR
(27-March-2024)**

CURRENT

A total of nineteen credits are required for Materials Science Minor; the current requirements are:

One of the following:

- EMAT 251 - Materials Structures & Properties (3 credits)
- EGEN 213 - Survey of MET & MAT Engineering (3 credits)

One of the following:

- EMET 307 - M&ME Thermodynamics (3 credits)
- CHMY 373 - Physical Chemistry - Kinetics & Thermodynamics (3 credits)

All of the following:

- EMAT 351 - Fundamentals of Materials (3 credits)
 - EMAT 353 - Microstructural Interpretation (1 credit)
 - EMAT 354 - Materials Engineering & Design Lab (1 credit)
 - EMAT 362 - Ceramic Materials (3 credits)
 - EMAT 472 - Materials Engineering & Design (2 Credits)
- Note: Ceramic Materials has been changed to EMAT 362 – Ceramic Materials (2 Cr) and EMAT 363 – Ceramic Materials Laboratory (1Cr)*

One of the following:

- CHEM 5506 - Polymer Chemistry (3 credits)
 - EMAT 460 - Polymeric Materials (3 credits)
- Note: Neither of these courses are currently offered. The M&ME program does offer EMAT 360 – Polymers Processing (2 Cr) and EMAT 361 – Polymers Processing Laboratory (1 Cr)*

PROPOSED

A total of eighteen credits are required for the minor in Materials Science. The requirement is nine credits of core courses and nine credits of electives.

Core courses:

1. Either EMAT 251 – Materials Structure and Properties or EGEN 213 – Survey of Metallurgical and Materials Engineering (3 credits)
2. Either EMET 307 – Metallurgical and Materials Engineering Thermodynamics or CHMY 373 – Thermodynamics and Kinetics (3 credits)
3. EMAT 351 – Fundamentals of Materials (2 credits)
4. EMAT 353 – Microstructural Interpretation (1 credit)

Electives:

Students complete the minor by selecting nine credits of courses with the EMAT or EMET designation. It is understood that students are also responsible for passing any prerequisite courses for the required and elective courses. The elective courses will be decided in consultation with the student's academic advisor and an M&ME department faculty member.

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 fewer.
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 4/16/24

Dept. Petroleum Engineering

College Lance College of Mines and Engineering

Program _____

CRC Representative Dave Rathgeber

Description of Request: _____

Add geomechanics class, drop structural class, move thermodynamics class, change name to Production II class
Drop GEO 403 as a pre-req from PET 426 and Pet 427;

Move Soc elective from Sophomore Spring to Senior Spring to balance load

Current Course or Program Information: _____

Number (Assigned By CRC): _____

Proposed Change

<u>Course #</u>	<u>Name</u>	<u>Credits</u>	<u>Pre-req.</u>
Pet 430	Reservoir Geomechanics	3	Pet 404 and PET 348
Reservoir Geomechanics provides a broad understanding of fundamental geomechanical rock properties and knowledge of how to use different methods to determine geomechanical properties and in situ stresses. Applications to wellbore stability, hydraulic fracturing and reservoir compaction are covered.			
Revise BS curriculum (see attached), specifically Remove GEO 403, add PET 430, and move Social Science General Education elective			
PET 426 - Reservoir Characterization Prerequisite(s): PET 404, GEOE 403 , PET 348 , and PET 410 Course generally offered both semesters.			
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):

Existing curriculum worksheet, new curriculum worksheet, Pet 430 syllabus

Assessment Leading to Request

Our students used to take Stratigraphy from the Geological Engineering dept, but once the professor retired, our students started taking Structural. But that class is not serving the needs of our students.

At the same time, our sponsoring society, SPE, recommends the sub-disciplines that a petroleum engineering should have knowledge in when they graduate, and the one area our students do not have is Reservoir Geomechanics, so we would like to add this as a required class. It is currently offered as an elective (it has taught 3 times), but the petroleum faculty believe it should be a class that all petroleum engineering students take.

Anticipated Impacts to "Other" Programs

dropping the GEO 403 will reduce the number of students taking Geological Engineering courses.

Impact on Library: none 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): asap

APPROVALS

Department Head Approval

Date 4/16/24

Todd Hoffman

Dean Approval

Date _____

[Signature]

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

PETROLEUM ENGINEERING WORKSHEET PREREQUISITES/COREQUISITES

Listed below are those subjects required as either prerequisites or corequisites for required courses and Petroleum elective courses. These requirements may differ slightly from those published in the current catalog. However, their basis is to ensure that students have the necessary background material to profit from the course. In special cases, these requirements may be waived after discussion with the instructor. It is the responsibility of the student, not the advisor or department, to know and meet these requirements before enrolling in a course.

COURSE	PREREQUISITE(S)	COREQUISITE(S)	COURSE	PREREQUISITE(S)	COREQUISITE(S)
CHMY 141		M 151			
CHMY 142		CHMY 141	PET 201	CHMY 141, CHMY142, EGEN101, WRIT 101 or WRIT 121	M 172, GEO 101
CHMY 143	CHMY 141		PET 205	CHMY 141, CHMY142, WRIT 101 or WRIT 121	M 172, PET2101
ECNS 203			PET 207	PET 201, EGEN 101	
EGEN 101		M 151	PET 225	PET 201, WRIT 101 or WRIT 121	
EGEN 194		EGEN 101	PET 301	PET 201, PHSX 234, EGEN 201, 335, GEO 257	
EGEN 201	PHSX 234		PET 302	PET 304, 372, PHSX 234, 235, 236, EGEN 201, 335	
EGEN 305	EGEN 201, M 172		PET 303	PET 301	PET 301
EGEN 306	EGEN 305	EGEN 305	PET 304	PET 201, 205	GEO 257, PHSX 235
EGEN 324	PHSX 235		PET 305	PET 201, PHSX 234, 236, EGEN 201, 335	
EGEN 325	At least JR standing		PET 307	PET 205	PET 302
EGEN 335	EGEN 201, M 172		PET 348	PET 225, 301, 304, GEO 257, PHSX 237	
GEO 101			PET 372	PET 201, 205, CHMY 141, 143,	EGEN 335, PHSX 235
GEO 257	GEO 101		PET 401	PET 301	
GEOE 403	GEO 101, EGEN 305		PET 402	PET 302, PHSX 234, 235, 236, EGEN 201, 335	
M 171	M 151 or ACT above 27 or SAT 610		PET 404	PET 304, 372, M 273	M 274
M 172	M 171		PET 410	PET 404, M 274	
M 273	M 172		PET 426	PET 348, 404, 410, GEO 403	
M 274	M 273		PET 427	PET 348, 404, 410, GEO 403	PET 426
M 333	M 172		PET 442	PET 404 & Consent of Instructor	
PHSX 234	M 171	M 172	PET 444	PET 404	
PHSX 235	PHSX 234, M 172	M 273	PET 446	PET 404, EGEN 325	
PHSX 236	PHSX 234	PHSX 235	PET 452	PET 372, 404	
PHSX 237	PHSX 234 & 235, M 273	M 274	PET 453	PET 307, 372	
STAT 332	M 172		PET 463	PET 301, 303	
WRIT 101 or 121	WRIT 095 or test placement into WRIT 101		PET 499W	Graduating Senior	
WRIT 321	WRIT101 or 121 and Junior Standing		PET 501	PET 301, 303	
			PET 502	Consent of Instructor	
			PET 503	PET 302, 404, Senior in Pet Engr	
			PET 504	PET 404	
			PET 505	PET 302, 404	
			PET 511	PET 410	
			PET 544	PET 444 or Consent of Instructor	

2024-2025 PETROLEUM ENGINEERING CURRICULUM WORKSHEET

PET TECH STUDENTS

Revision Date: 04/16/2024

Student:	
Advisor:	Date:

			SEMESTERS										
Year/Semester	Course Number	Course Title	# Credits	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
FRESHMAN FALL SEMESTER (17 credits)	CHMY 141	College Chemistry	3										
	CHMY 142	College Chemistry Lab I	1										
	EGEN 101	Intro. To Eng. Calcs & Prob Solv	3										
	² EGEN 194	² Freshman Engineering Seminar	1										
	M 171	Calculus I	3										
	WRIT 121 or 101	Intro Tech Writ (preferred) or College Writ I	3										
	³ Hum Elec		3										
FRESHMAN SPRING SEMESTER (16 credits)	CHMY 143	College Chemistry II	3										
	GEO 101	Intro to Physical Geology Lect/Lab	3										
	M172	Calculus II	3										
	PET 201	Elements of Petroleum Engineering	3										
	PET 205	Pet Eng Lab I Reservoir	1										
	PHSX 234	Gen Physics I	3										
SOPHOMORE FALL SEMESTER (18 credits)	PET 225	Presentation and Professionalism	1										
	EGEN 201	Statics	3										
	GEO 257	Sedimentology	3										
	M 273	Multivariable Calculus	4										
	PET 304	Rock Properties	3										
	PHSX 235	Gen Physics- Heat, Sound & Optics	3										
	PHSX 236	General Physics Lab- Heat, Sound & Optics	1										
SOPHOMORE SPRING SEMESTER (16 credits)	EGEN 203	Principles of Macro & Micro Econ	3										
	EGEN 335	Fluid Mechanics	3										
	M 274	Intro to Diff Equations	3										
	PET 372	Pet Fluids & Thermo	3										
	PET 207	Petroleum Computer Fundamentals Lab	1										
	PHSX 237	General Physics- Magnetism & Wave Motion	3										
JUNIOR FALL SEMESTER (17 credits)	EGEN 305	Mech of Materials	3										
	EGEN 306	Mech of Materials Lab	1										
	PET 301	Well Drilling	3										
	PET 303	Drilling Fluid Lab	1										
	¹ PET 404	¹ Reservoir Eng	3										
	STAT 332 or M 333	Statistics for Sci & Engr OR Linear Algebra	3										
	WRIT 321	Advanced Tech Writing	3										
	EGEN 325	Engineering Economic Analysis	3										
JUNIOR SPRING SEMESTER (18 credits)	EGEN 324	Thermodynamics I	3	*moved Thermo from Senior Fall to Junior Spring							*Removed GEO 403 - from required		
	PET 302	Pet Production Engr	3										
	PET 305	Completions	3										
	PET 348	Well Logging	3										
	¹ PET 410	¹ Reservoir Simulation	3										
	¹ PET 402	¹ Production Engineering II	3	*changed name and content of course									
SENIOR FALL SEMESTER (16 credits)	¹ PET 426	¹ Reservoir Characterization	3										
	PET 430	Reservoir Geomechanics	3	*added Geomechanics to Senior Fall									
	PET 453	Petroleum Production Lab	1										
	⁴ PET Elec		3										
	³ Hum Elec		3										
SENIOR SPRING SEMESTER (18 credits)	¹ PET 446	¹ Petroleum Project Evaluation	3										
	¹ PET 499W	¹ Senior Engineering Design	3										
	^{1&4} PET Elec		3										
	⁵ Tech Elec		3										
	⁵ Tech Elec		3										
	³ Soc Elec		3	*moved Soc Elec from Soph. Spring to Senior Spring									
			136										
MINOR													
NON-MAJOR													
TOTAL CREDITS													
			Date										
			Advisor										

¹ CORE COURSES - These courses must be completed at MT Tech.

² Transfer Students ONLY: 1-credit Engineering OR Science elective (100-level or higher) OR Technical Elective to replace EGEN 194. (Must submit Course Substitution form.)

³ Humanities & Social Science acceptable electives listed in catalog

⁴ Petroleum Engineering Elective: 400- or 500-level

⁵ Technical Elective: 300-, 400- or 500-level Engineering, Business, Math, Statistics or Computer Science

PETROLEUM ENGINEERING WORKSHEET PREREQUISITES/COREQUISITES

Listed below are those subjects required as either prerequisites or corequisites for required courses and Petroleum elective courses. These requirements may differ slightly from those published in the current catalog. However, their basis is to ensure that students have the necessary background material to profit from the course. In special cases, these requirements may be waived after discussion with the instructor. It is the responsibility of the student, not the advisor or department, to know and meet these requirements before enrolling in a course.

COURSE	PREREQUISITE(S)	COREQUISITE(S)	COURSE	PREREQUISITE(S)	COREQUISITE(S)
CHMY 141		M 151			
CHMY 142		CHMY 141	PET 201		
CHMY 143	CHMY 141		PET 205		PET 201 CHMT 141
ECNS 203			PET 207	EGEN 101	PET 201
EGEN 101		M 151	PET 225	PET 201, WRIT 101 or WRIT 121	
EGEN 194		EGEN 101	PET 301	EGEN 201, EGEN 335	
EGEN 201	PHSX 234		PET 302	PET 304, 372, PHSX 234, 235, 236, EGEN 201, 335	
EGEN 305	EGEN 201, M 172		PET 303		PET 301
EGEN 306	EGEN 305	EGEN 305	PET 304	PET 201	PET 205
EGEN 324	PHSX 235		PET 305	PHSX 234, EGEN 201, EGEN335	
EGEN 325	At least JR standing		PET 348	PET 225, 301, 304, GEO 257, PHSX 237	
EGEN 335	EGEN 201, M 172		PET 372	PET 201, 205, CHMY 141, 143,	EGEN 335, PHSX 235
GEO 101			PET 401	PET 301	
GEO 257	GEO 101		PET 402	PET 302, PHSX 234, 235, EGEN 201, 335	
M 171	M 151 or ACT above 27 or SAT 610		PET 404	PET 304, PET 372, M 273	M 274
M 172	M 171		PET 410	PET 404, M 274	
M 273	M 172		PET 426	PET 348, 404, 410	
M 274	M 273		PET 427	PET 348, 404, 410	PET 426
M 333	M 172		PET 430	PET 404, PET 348	
PHSX 234	M 171	M 172	PET 444	PET 404	
PHSX 235	PHSX 234, M 172	M 273	PET 446	PET 404, EGEN 325	
PHSX 236	PHSX 234	PHSX 235	PET 452	PET 372, 404	
PHSX 237	PHSX 234 & 235, M 273	M 274	PET 453	PET 207, 372	
STAT 332	M 172		PET 463	PET 301, 303	
WRIT 101 or 121	WRIT 095 or test placement into WRIT 101		PET 499W	Graduating Senior	
WRIT 321	WRIT101 or 121 and Junior Standing		PET 501	PET 301, 303	
			PET 502	Consent of Instructor	
			PET 503	PET 302, 404, Senior in Pet Engr	
			PET 504	PET 404	
			PET 505	PET 302, 404	
			PET 511	PET 410	
			PET 544	PET 444 or Consent of Instructor	

Pet 430 – Reservoir Geomechanics

Time –

Room –

Instructor: B. Todd Hoffman
NRB 350
thoffman@mtech.edu
496-4753

Objectives: Provide students with a broad knowledge of reservoir geomechanics.

Outcomes: (1) Understand the fundamental geomechanical rock properties.
(2) Know the different methods used to determine/measure/estimate the various geomechanical properties and in situ stresses
(3) Apply knowledge to wellbore stability, hydraulic fracturing and reservoir compactions applications

Textbook: Reservoir Geomechanics, by Mark Zoback (strongly recommended)

Prerequisites: Pet 404 and Pet 348

Grading:	6-8 HWs	200 pts		90-100	A
	Midterm	100 pts		80-89	B
	Project	100 pts		70-79	C
	<u>Final</u>	<u>100 pts</u>		60-69	D
	Total	500 pts		0-59	F

The +/- system is used.

Policies: (1) Homework: You can work together, but everyone turns in their own assignment. One “free” late homework per semester (up to a week). Other late assignments lose 10% per week.
(2) Professionalism: Be respectful. Be in class on time.
(3) Academic dishonesty will not be tolerated.

Office Hours: by appointment (including evenings and weekends if needed). Please email (thoffman@mtech.edu) me to set up time. Or in my office (NRB 350) on T 11-12, W 10-11 & R 1-2.

Final Exam: Tuesday, Dec. 7, 2021 at 11:30 am.

Course Outline (subject to change)

Week of:	Topics	Assignments
Aug. 23	Unit 1 - Introduction / Unconventional Reservoirs	
Aug. 30	Unit 2 - The Tectonic Stress Field	
Sept. 6	Unit 3 - Pore Pressure at Depth	HW1 due
Sept. 13	Unit 4 - Basic Constitutive Laws	HW2 due
Sept. 20	Unit 5 - Rock Strength	
Sept. 27	Units 6 - Faults	HW3 due
Oct. 4	Units 7 - Fractures	HW4 due
Oct. 11	Exam	Exam 1
Oct. 18	Unit 8 - Stress Concentrations around Vertical Wells	HW5 due
Oct. 25	Unit 9 - Measuring S_{hmin} and Constraining S_{Hmax}	
Nov. 1	Unit 10 - Critically-Stressed Faults	HW6 due
Nov. 8	Unit 11 - Wellbore Stability	HW7 due
Nov. 15	Unit 12 - Unconventional Reservoirs	
Nov. 22	Unit 13 - Compaction	HW8 due
Nov. 29	Unit 14 - Production/Injection Induced Seismicity	Project due
Dec. 6	Finals Week	Final

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*):
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- 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 May 1, 2023

Dept. Petroleum

Program _____

College SME

CRC Representative Lee Richards

Description of Request: _____

Add content to the Course to cover oil/water/gas separation, and design the required vessels and procedures.

Current Course or Program Information: _____

Pet 402 Artificial Lift Design 3 Credits Pet 302, Phsx 234, Phsx 235, Phsx 236, EGEN 201, EGEN 335

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
Pet 402	Production Engineering II	3 Credits (Lecture)	Pet 302, Phsx 234, Phsx 235, EGEN 201, EGEN 335
The design and operation of well fluid artificial lift systems, including: sucker rod pumping, progressing cavity pumps, submersible electric pumps, down hole hydraulic pumps, gas lift, and plunger lift. Also, oil/water/gas separation is covered, and well as design procedures for the necessary treating vessels.			
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

Oil/water/gas separation is essential to production engineering, and is not routinely covered elsewhere in our curriculum

Anticipated Impacts to “Other” Programs

None

Impact on Library: None required _____ 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): Fall 2023 _____

APPROVALS

Department Head Approval

Date 4/16/24

Todd Hoffman

Dean Approval

Date _____

[Signature]

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Petroleum 402
Production Operations II
Fall 2023

Instructor: Burt J. Todd
Email: btodd@mtech.edu
Phone: (406) 496-4834

Office: 343 NRB
Office hours: Open Door Policy

Lecture Schedule: MWF 8:00-8:50 AM, NRB 128
Prerequisites: PET 302, PHSX 234, PHSX 235, PHSX 236, EGEN 201, EGEN 335
Final Exam: Thursday December 7, 2023, 3:00-5:00 PM
Textbook: None required
Reference: Handbook of Petroleum Engineering, Bradley, SPE

Course Description: The design and operation of well fluid artificial lift systems, including: sucker rod pumping, progressing cavity pumps, submersible electric pumps, downhole hydraulic pumps, and gas lift. Also, design of field oil/water/gas separation vessels is discussed.

Course Objectives: To equip Petroleum Engineering students with the skills necessary to design and analyze artificial lift systems for oil and gas wells. Specific skills include:

1. Choose the optimal artificial lift system, based on well conditions and environmental constraints.
2. Determine the design well rate based on inflow performance analysis.
3. Perform design procedures for beam lift, progressive cavity pumps, electric submersible pumps, subsurface hydraulic pumps, gas lift, and plunger lift systems.
4. Diagnose performance problems of each type of pump after the installation, with the goal of optimizing run life and pump efficiency.
5. Be able design and trouble shoot simple field separation operations.

Course Outcomes: Students participating in this course will be able to apply inflow performance relationships to determine well potential, evaluate well conditions to determine the optimal form of artificial lift for that well, design and size an artificial lift installation for the well, and evaluate/troubleshoot the performance of the well and lift installation.

Accommodations for Students with Disabilities:

Students with disabilities who believe they may need accommodations in this class are encouraged to contact a Montana Tech Disability Services Coordinator (DSC) at 496-4429. For any student who may need an accommodation due to a disability, please make an appointment to see me. A letter from a Montana Tech Disability Coordinator authorizing your accommodations is needed.

Course Outline:

- I. Introduction**
 - a. Purpose of Artificial Lift
 - b. Artificial Lift Basics
 - c. Well Inflow Performance
- II. Gas Lift**
- III. Beam Lift**
- IV. PCP's and ESP's**
 - a. Electric Submersible Pump Applications
 - b. Progressive Cavity Pump Applications
- V. Oilfield Fluid Separation**
 - a. Gas/liquid separators
 - b. Heater-treaters
 - c. Gas Treating
- VI. Subsurface Hydraulic Pumps**
 - a. SHP's – Piston Type
 - b. SHP's – Jet Type
- VII. Other Topics**
 - a. Gas Well Liquid Unloading
 - b. Plunger Lift
 - c. Problem Well Analysis
 - d. ESG (Environment/Safety/Governance)

Contribution to Professional Component: Engineering Topics - 3 credits

Relationship of Course to Petroleum Engineering Program Outcomes: The course builds upon the basic knowledge of petroleum artificial lift systems to expand into the area of applications and design

Attachment: T1_P3_Pet_402_Ethics_&_Grading_F2023

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):
Admission Requirement Description

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 fewer.
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:

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 - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
 - Academic Proposal Request Form
 - Program Termination and Moratorium Form
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 - Academic Proposal Request Form
 - Curriculum Proposal Form
 - Documents as listed under establishing a new course (see section 1)**
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 - Academic Proposal Request Form
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 - 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)**

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- Establishing a new postsecondary educational program

- Request to Plan (RTP)
- Academic Proposal Request Form
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 - Academic Proposal Request Form
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- Curriculum Proposal
- Completed Intent to Plan Form

Date 4/17/24

Dept. SHIH

Program MS IH Distance Learning/Prof Track

College LCME

CRC Representative Roger Jensen

Description of Request: _____

Revise the admission criteria for the MS Industrial Hygiene Distance Learning/Professional Track degree.

Current Course or Program Information: _____

Please see admission requirements below with the following requirement removed: Two years of safety and health work experience...

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
	Graduate Admission Requirements		
	<p>Applicants are admitted on a basis of acceptable undergraduate academic preparation, written personal statement and and reference recommendations. Applicants must have a bachelor's degree from a regionally accredited college or university that included as a minimum 19 credits of college-level mathematics and science, (including first semester calculus and statistics), biology (including anatomy/physiology), chemistry (including organic chemistry), and physics.</p> <p>Applicants with a bachelor's degree from a regionally accredited college or university may alternatively demonstrate adequate math and science preparation if they hold the Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP), Certified Professional Ergonomist (CPE), or Certified Health Physicist (CHP) credential, or *equivalent international professional certifications, or if they have completed an advanced degree in a science-based discipline.</p> <p>Two years of safety and health related work experience is also a requirement for admittance to this program. (removed)</p> <p>*These equivalent international professional certifications must be reviewed and approved by the IH Distance Learning/Professional Track Program Coordinator on a case-by-case basis.</p>		
	<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

Our MS Industrial Hygiene Distance Learning / Professional Track program was inceptioned in 2002 and we obtained ANSAC/ABET accreditation in 2008. The two year work requirement component for admission was implemented to ensure that students were adequately prepared for the program and was in lieu of the GRE. The GRE is no longer required for our graduate programs. Furthermore, our assessments have revealed that work experience can be quite variable. For example, students may have a strong safety background, but this does not necessarily translate to industrial hygiene specific experience. The undergraduate educational preparatory guidelines currently implemented will ensure that students have an adequate background in math and science to succeed in the program. In addition, competing programs offering MS Industrial Hygiene degrees online do not require work experience.

Anticipated Impacts to "Other" Programs

None

Impact on Library: None _____ has consulted with Scott Juskiwecz, Director _____ 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): 2024 catalog _____

APPROVALS

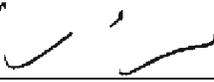
Department Head Approval

Date 4/17/24

Julie F. Hart

Dean Approval

Date 4/17/24



Graduate Council Approval

Date _____

CRC Approval

Date _____

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.

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See workflow document

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- Completed CRC Form, with all Signatures and Attachments based on level of request (see below)
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LEVEL of Request

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- 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
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 - Academic Proposal Request Form
 - Documents as listed under establishing a new course (see section 1)**

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- Curriculum Proposal
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- Curriculum Proposal
- Completed Intent to Plan Form

Date 4/17/24

Dept. SHIH

Program MS IH and MS IH Dist Learn/Prof Track

College Lance College M & E

CRC Representative Roger Jensen

Description of Request: _____

Current Course or Program Information: _____

Please see below (doesn't fit in the space provided here).

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
Current Catalog Course Numbering Revised Catalog Course Numbering			
I.H. 5076	- Statistical Analysis to I.H. 507 - Statistical Analysis		
I.H. 5086	- Aerosol Science to I.H. 508 - Aerosol Science		
I.H. 5136	- Industrial Hygiene Management to I.H. 513 - Industrial Hygiene Management		
I.H. 5156	- Occupational and Community Noise to I.H. 515 - Occupational and Community Noise		
I.H. 5166	- Advanced Industrial Ventilation to I.H. 516 - Advanced Industrial Ventilation		
I.H. 5276	- Advanced Industrial Toxicology to I.H. 527 - Advanced Industrial Toxicology		
I.H. 5280	- Multi-disciplinary Team Practicum to I.H. 528 - Multi-disciplinary Team Practicum		
I.H. 5286	- Sampling & Evaluation of Health Hazards (Distance Learning Students Only) to I.H. 528 - Sampling & Evaluation of Health Hazards (Distance Learning Students Only)		
I.H. 5296	- Sampling & Evaluation of Health Hazards to I.H. 529 - Sampling & Evaluation of Health Hazards		
I.H. 5306	- Sampling and Evaluation of Health Hazards Lab to I.H. 530 - Sampling and Evaluation of Health Hazards Lab		
I.H. 5326	- Sampling & Evaluation of Health Hazards Lab Residency to I.H. 532 - Sampling & Evaluation of Health Hazards Lab Residency		
I.H. 5326	- Sampling and Evaluation of Health Hazards Lab Residency (Distance Students only) to I.H. 532 - Sampling and Evaluation of Health Hazards Lab Residency (Distance Students only)		
I.H. 5426	- Principles of Epidemiology to I.H. 542 - Principles of Epidemiology		
I.H. 5476	- Strategies For Occupational Exposure Assessment to I.H. 547 - Strategies For Occupational Exposure Assessment		
I.H. 5606	- Systems Safety & Process Safety Management to I.H. 560 - Systems Safety & Process Safety Management		
I.H. 5626	- Radiological Health & Safety to I.H. 562 - Radiological Health & Safety		
I.H. 5676	- Respiratory Protection to I.H. 567 - Respiratory Protection		
I.H. 5686	- Ergonomics for Industrial Hygienists to I.H. 568 - Ergonomics for Industrial Hygienists		
I.H. 5946	- I.H. Graduate Seminar to I.H. 594 - I.H. Graduate Seminar		
I.H. 5966	- Industrial Hygiene Report to I.H. 596 - Industrial Hygiene Report		
I.H. 5976	- Special Problems to I.H. 597 - Special Problems		
I.H. 5986	- Comprehensive Written & Oral Exam to I.H. 598 - Comprehensive Written & Oral Exam		
I.H. 5996	- Thesis Research to I.H. 599 - Thesis Research		

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

Alignment with other graduate program course offerings at Montana Tech.

OSH 406 and 407 - Small Particle Technology was formerly an elective in the MS IH Program. We are replacing this elective with an existing course, IH 508 - Aerosol Science.

Anticipated Impacts to "Other" Programs

None

Impact on Library: None _____ has consulted with Scott Juskievicz, Director _____ 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): 2024 catalog _____

APPROVALS

Department Head Approval

Date 4/17/24

Julie F. Hart



Dean Approval

Date 4/17/24

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

MS IH Program Revisions

Current Catalog Course Numbering	Revised Catalog Course Numbering
I.H. 5076 - Statistical Analysis	I.H. 507 - Statistical Analysis
I.H. 5086 - Aerosol Science	I.H. 508 - Aerosol Science
I.H. 5136 - Industrial Hygiene Management	I.H. 513 - Industrial Hygiene Management
I.H. 5156 - Occupational and Community Noise	I.H. 515 - Occupational and Community Noise
I.H. 5166 - Advanced Industrial Ventilation	I.H. 516 - Advanced Industrial Ventilation
I.H. 5276 - Advanced Industrial Toxicology	I.H. 527 - Advanced Industrial Toxicology
I.H. 5280 - Multi-disciplinary Team Practicum	I.H. 528 - Multi-disciplinary Team Practicum
I.H. 5286 - Sampling & Evaluation of Health Hazards (Distance Learning Students Only)	I.H. 528 - Sampling & Evaluation of Health Hazards (Distance Learning Students Only)
I.H. 5296 - Sampling & Evaluation of Health Hazards	I.H. 529 - Sampling & Evaluation of Health Hazards
I.H. 5306 - Sampling and Evaluation of Health Hazards Lab	I.H. 530 - Sampling and Evaluation of Health Hazards Lab
I.H. 5326 - Sampling & Evaluation of Health Hazards Lab Residency	I.H. 532 - Sampling & Evaluation of Health Hazards Lab Residency
I.H. 5326 - Sampling and Evaluation of Health Hazards Lab Residency (Distance Students only)	I.H. 532 - Sampling and Evaluation of Health Hazards Lab Residency (Distance Students only)
I.H. 5426 - Principles of Epidemiology	I.H. 542 - Principles of Epidemiology
I.H. 5476 - Strategies For Occupational Exposure Assessment	I.H. 547 - Strategies For Occupational Exposure Assessment
I.H. 5606 - Systems Safety & Process Safety Management	I.H. 560 - Systems Safety & Process Safety Management
I.H. 5626 - Radiological Health & Safety	I.H. 562 - Radiological Health & Safety
I.H. 5676 - Respiratory Protection	I.H. 567 - Respiratory Protection
I.H. 5686 - Ergonomics for Industrial Hygienists	I.H. 568 - Ergonomics for Industrial Hygienists
I.H. 5946 - I.H. Graduate Seminar	I.H. 594 - I.H. Graduate Seminar
I.H. 5966 - Industrial Hygiene Report	I.H. 596 - Industrial Hygiene Report
I.H. 5976 - Special Problems	I.H. 597 - Special Problems
I.H. 5986 - Comprehensive Written & Oral Exam	I.H. 598 - Comprehensive Written & Oral Exam
I.H. 5996 - Thesis Research	I.H. 599 - Thesis Research

**MS DEGREE IN INDUSTRIAL HYGIENE
ON-CAMPUS GRADUATE PROGRAM**

Accredited by ANSAC/ABET <http://www.abet.org>

REQUIRED COURSES (35 credits)

Course #	Title of Course	Term	Credits
OSH 421	Industrial Hygiene I ¹		3
OSH 422	Industrial Hygiene II ¹		3
I.H. 5076	Statistical Analysis		3
I.H. 5136	Industrial Hygiene Management		2
I.H. 5276	Advanced Industrial Toxicology		3
I.H. 5296	Sampling & Evaluation of Health Hazards ¹		2
I.H. 5306	Sampling & Evaluation of Health Hazards Lab ¹		1
I.H. 5426	Principles of Epidemiology		3
I.H. 5686	Ergonomics for Industrial Hygienists		3
I.H. 5946	IH Graduate Seminar I		1
I.H. 5996	Thesis Research		6
I.H. 5606	Systems Safety & Process Safety Management ²		3
TC 5150 OR ENGR 5940	Graduate Writing Seminar Engineering Seminar (prerequisite IH 5946)		1 1

Total Core Credits for MS IH On-Campus

35

¹ Graduate students with a B.S. Degree in OSH from Montana Tech have taken these courses but will be required to complete 9 elective credits to replace the 9 core credits.

² These students also have an adequate background in safety and will be required to complete an additional 3 credit elective.

ELECTIVE COURSES (at least 2 credits)

Course #	Title of Course	Term	Credits
OSH 406	Small Particle Technology		2
OSH 407	Small Particle Technology Lab		1
OSH 444	Law & Ethics for OSH		2
OSH 427	Mining Safety		3
OSH 416	Industrial Ventilation		2
OSH 424	Environmental Health		3
I.H. 5156	Occupational & Community Noise		3
I.H. 5476	Strategies for Occ. Exposure Assessment		3
I.H. 5676	Respiratory Protection		3
I.H. 5626	Radiological Health & Safety		3
I.H. 5976	Special Problems		1 to 4

TOTAL CREDITS - MS IH Degree Program

37

**MS DEGREE IN INDUSTRIAL HYGIENE
ON-CAMPUS GRADUATE PROGRAM**

Accredited by ANSAC/ABET <http://www.abet.org>

REQUIRED COURSES (35 credits)

Course #	Title of Course	Term	Credits
OSH 421	Industrial Hygiene I ¹		3
OSH 422	Industrial Hygiene II ¹		3
I.H. 507	Statistical Analysis		3
I.H. 513	Industrial Hygiene Management		2
I.H. 527	Advanced Industrial Toxicology		3
I.H. 529	Sampling & Evaluation of Health Hazards ¹		2
I.H. 530	Sampling & Evaluation of Health Hazards Lab ¹		1
I.H. 542	Principles of Epidemiology		3
I.H. 568	Ergonomics for Industrial Hygienists		3
I.H. 594	IH Graduate Seminar I		1
I.H. 599	Thesis Research		6
I.H. 560	Systems Safety & Process Safety Management ²		3
TC 5150 OR	Graduate Writing Seminar		1
ENGR 5940	Engineering Seminar (prerequisite IH 594)		1

Total Core Credits for MS IH On-Campus 35

¹ Graduate students with a B.S. Degree in OSH from Montana Tech have taken these courses but will be required to complete 9 elective credits to replace the 9 core credits (unless in the accelerated MS program).

² These students also have an adequate background in safety and will be required to complete an additional 3 credit elective.

ELECTIVE COURSES (at least 2 credits)

Course #	Title of Course	Term	Credits
I.H. 508	Aerosol Science		3
OSH 444	Law & Ethics for OSH		2
OSH 427	Mining Safety		3
OSH 416	Industrial Ventilation		2
OSH 424	Environmental Health		3
I.H. 515	Occupational & Community Noise		3
I.H. 547	Strategies for Occ. Exposure Assessment		3
I.H. 567	Respiratory Protection		3
I.H. 562	Radiological Health & Safety		3
I.H. 597	Special Problems		1 to 4

TOTAL CREDITS - MS IH Degree Program 37

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Instructor information:

Julie Hart, PhD, CIH

Email: jhart@mtech.edu

Office: Science and Engineering, Rm 327, Phone: 406-496-4792

See Moodle website or LinkedIn for background on the instructor's qualifications.

Course Catalog Description:

This course is designed to provide students with an advanced understanding of aerosol exposure assessment. Topics such as air and particle properties that influence aerosol dispersion, aerosol deposition, aerosol dose, size selection criteria for aerosol sampling, relevant occupational and ambient exposure limits, and aerosol exposure assessments for contaminants from engineered nanoparticles to bioaerosols are covered.

Pre-requisite:

Graduate standing or consent of instructor.

Textbook:

Aerosol Technology, Properties, Behavior, and Measurement of Airborne Particles, William C. Hinds Vincent, 2nd Ed., 1999. ISBN-13: 978-0471194101 ISBN-10: 0471194107.

References:

- Aerosols Handbook: Measurement, Dosimetry, and Health Effects, Second Edition 2nd Edition. 2019 CRC Press. ISBN-13: 978-0367866112 ISBN-10: 0367866110
- American Conference of Governmental Industrial Hygienists – Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH 2021.
- National Institute for Occupational Safety and Health Manual of Analytical Methods. Available at: <https://www.cdc.gov/niosh/nmam/default.html>.
- Occupational Safety and Health Sampling and Analytical Methods. Available at: <https://www.osha.gov/dts/sltc/methods/index.html>.
- National Ambient Air Quality Standards. Available at: <https://www.epa.gov/criteria-air-pollutants>.

Course Objectives:

After successfully completing this course, the student will be able to:

- Describe the fundamental factors that influence aerosol movement in air including Stoke's law, terminal settling velocity, and aerodynamic diameter.
- Describe the primary and secondary deposition mechanisms of aerosols and inhaled dose.
- Understand aerosol dispersion properties.
- Interpret and apply occupational and ambient aerosol size selection sampling criteria, sampling media and exposure limits.
- Understand primary mechanisms for particle filter deposit analyses.
- Interpret and describe aerosol assessment case studies for contaminants, e.g., crystalline silica, asbestos, bio-aerosols (spores, pathogens), naturally occurring and engineered ultrafine (nano) particles.

Grading Criteria and Scale

Grading:	Three Exams.....	40%
	Module Assignments.....	40%
	Group case study project.....	20%

All grades will be determined as follows:

A	93-100
A-	89.51 — 92.99
B+	87 — 89.50
B	83 — 86.99
B-	79.51 — 82.99
C+	77 — 79.50
C	73 — 76.99
C-	69.51 — 72.99
D+	67 — 69.50
D	63 — 66.99
D-	59.51 — 62.99
F	< 59.50

Administrative Matter

Missed exams and labs: Students must notify instructor of excuse prior to the missed exam. Instructor will attempt to schedule these activities so as to avoid conflicts with the away-game travel of student athletes. The instructor will consider excuses on a case-by-case basis, and work with individual students to facilitate making up the activity. Making up required activities is a privilege, not a right. Quizzes are a component of class participation and will not be made up.

Academic honesty: The instructor will begin the course assuming all students are honest about their academic work. The assumption will be weakened if a student engages in an act that appears to be academic dishonesty. Students are expected to know the Montana Tech policy on student academic dishonesty. The policy applies to this course, and a link to the text of the policy is provided on the course website. Upon discovering an act of academic dishonesty, the instructor will assign a zero grade for the assignment, exam, or lab, and report the act to the Department Head and Dean. Additionally, the instructor may, at his discretion, assign an "F" grade for the course to a student who violates the campus academic dishonesty policy.

Disabilities: Students with disabilities who believe they may need accommodations in this class are encouraged to contact a Montana Tech Disability Services Coordinator (DSC) at either 496-4429 (North Campus) or 496-3730 (South Campus). Please obtain from them a letter from a Montana Tech Disability Coordinator authorizing your accommodations is needed.

Prepared by: Julie Hart

Date: February 12, 2022

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 fewer.
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 April 12, 2024

Dept. Safety, Health and Industrial Hygiene

Program Graduate Elective Course

College Lance College of Mines and Engineering

CRC Representative Roger Jensen

Description of Request: _____

Change elective course name

Current Course or Program Information: _____

IH 524 Advanced Environmental Health

Number (Assigned By CRC): IH 524

Proposed Change

Course #	Name	Credits	Pre-req.
IH 524	Advanced Environmental Health and Biological Site Safety	3	Grad Student

This course provides a broad understanding of Environmental Health (EH) in the context of Public Health (PH) Policy. We will explore human and environmental factors that influence natural, urban, rural and workplace environments as well as human health risks from chemical, biological and physical agents. An emphasis is placed on biological site safety in a post-pandemic world. Students will learn about social and occupational responses, tools and resources available for guiding environmental and public health policy decisions as well as EH practice, prevention and intervention strategies to mitigate threats and concerns.

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

We are a collaborative partner on NIEHS grant with 4 other universities that led to the development the BioSTET training material. The Grant required that each institution integrate the content into one course on their campus. The SHIH department identified IH 524 as the best fit for the content. The content has been integrated into the course. The name change is to better reflect the modified course.

Anticipated Impacts to "Other" Programs

None

Impact on Library: None has consulted with Scott Juskievicz, Director 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): Spring 2025

APPROVALS

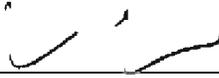
Department Head Approval

Date 4/12/24

Julie F. Hart

Dean Approval

Date 4/18/24



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Core Classes (28 credits)

Fall Semester Courses		Grade / Term	Spring Semester Courses		Grade / Term	Summer Semester Courses		Grade / Term
OSH 421	IH I	3 /	IH 5286	Sampling	2 /	OSH 422	IH II	3 /
IH 5426	Princ of Epi	3 /	IH 5276	Adv Ind Tox	3 /	IH 5136	IH Mngt	2 /
IH 5606	System Safety	3 /	IH 5076	Statistical Analysis	3 /	IH 5686	Adv Ergo	2 /
IH 5986	Comp Exam*	3 /	IH 5986	Comp Exam*	3 /	IH 5286	Sampling LAB	1 /
						IH 5986	Comp Exam*	3 /

*All semesters

Electives (9 credits)

Fall Semester Courses		Grade / Term	Spring Semester Courses		Grade / Term	Summer Semester Courses		Grade / Term
OSH 406	Small Part**		IH 5476	Strat for Occ Exposure	3 /	IH 5166	Adv. Ind Vent	3 /
IH 5156	Noise	3 /	IH 524	Advanced Env Health	3 /	IH 5676	Ind Resp Prot	3 /
IH 5626	Radiological	3 /						

** Every other Year

Advanced Environmental Health and Biological Site Safety
IH 524
Spring 2024

Professor: David P. Gilkey, D.C., Ph.D., CPE, CSP, REHS/RS
Department of Safety, Health, and Industrial Hygiene
Room 315, Science and Engineering Building
Phone: 406-496-4895
Cell: 970-980-3368
Home: 406-299-2498 (Please don't call after 8:00 pm – I retire early)
Email address: dgilkey@mtech.edu

Office hours: This is an online course and therefore communication will be asynchronous. Please email, text, or call me if you have a question or wish to send me a message. If you are visiting campus, please drop in my office door is usually open and you are welcome to come in and speak with me.

Class Meeting Time and Location: Worldwide web to engage asynchronous Learning. This course is entirely online and does not meet in person or on campus. Asynchronous learning allows individuals to set their schedules to keep pace with assignments and course communications.

Credits: 3

Prerequisites: Graduate student or permission from the instructor

Class Materials: Course materials, links, available resources will be posted to the class website. Materials may include lecture notes, handouts, articles, links, verbal recordings, and/or multimedia sources. Please read and/or review materials that pertain to each class session so that we can have the full benefit of being informed about the topics presented. The recorded lecture will provide core content that is supplemented with additional readings.

Introduction: This course was developed through a grant/alliance with IH and OSH professionals at the University of Utah, Weber State University, UCLA, Montana Tech University, Texas A&M University, and Cal Poly San Luis Obispo.

Each module has unique learning objectives that will be explored through the presentation of materials and answering practice questions. The class will explore potential occupational safety and health (OSH), industrial hygiene (IH), and environmental health (EH) solutions to OSH, IH and EH threats.

One long-term goal of the grant/alliance is to have IH graduate students from UCLA, Montana Technological University, Texas A&M University, and the University of Utah working alongside Cal Poly biomedical engineering graduate students to design solutions.

Grant Information

- Grant: NIHR25- Superfund Research Program Occupational Health and Safety Education Programs on Emerging Technologies (RFA-ES-20-011)
- Title: Biological Hazard Site Training in Emerging Technologies (BioSTET) for Health and Safety
- Specific Aims:
 - o Specific Aim#1: To successfully, develop, implement, and assess twelve continuing education modules and learner certificate programs for site biological/infectious agent health and safety. Including HAZWOPER Training. ([What is HAZWOPER Training and Who Needs It? \(hazwoper-osha.com\)](http://hazwoper-osha.com))
 - o Specific Aim #2: To successfully develop, implement, and assess a collaborative and joint upper-level undergraduate/graduate research topics course in site biological/infectious agent health and safety
 - o Specific Aim #3: To successfully develop, implement, and assess a collaborative graduate (and undergraduate) applied topics course in site biological/infectious agent health and safety

Course Description: The Advanced Environmental Health and Biological Site Safety (IH 524) course provides a broad understanding of environmental health (EH) and biological site safety (BSS) from public health (PH) and occupational safety & health (OSH) perspectives. We will explore human and environmental factors that influence health outcomes in natural, urban, rural, and workplace environments. We will explore human health risks from chemical, biological, and physical agent exposures and associated policy and protective practice. Students will learn about protective measures, social responses, tools, and resources available for OSH/IH/EH practice, prevention, and intervention strategies to mitigate threats and concerns. Major OSH, environmental, and public health laws specific to topics will be presented and discussed.

ABET: Learning Objective 22 - Students will have the ability to obtain professional certification. IH 524 is an elective topic to become core in the IH curriculum at some point in the future. This course has been added to the graduate program to grow student knowledge, skills, and abilities in EH for IH practice and certification.

Course Objectives:

Upon completion of the course, students will be able to:

- Describe the direct and indirect human, ecological, and safety effects of major environmental, and occupational agents of community, state, regional, national, and global importance.
- Explain the general and specific mechanisms of infection and toxicity responses to various infectious and chemical agents.
- Specify approaches for current exposure and assessment methods.
- Detail a Site Health and Safety Plan Integration of Biological Safety

- Discuss quantitative Bioaerosol Characterization techniques and qualitative characterization.
- List emerging topics and techniques in safe site worker hygiene.
- Describe novel social distancing strategies for on-site workers.
- Respiratory protection technologies and integration and emerging techniques for effective PPE donning and doffing.
- Effective decontamination and zones of control for biological safeguarding.
- Site Control of Bloodborne Pathogens (BBPs) and animals, insects, and plants.
- Emerging strategies for effective first aid and CPR and novel Sterilization Techniques for Site Safety.

Professionalism: Students are expected to be respectful of all other students and instructors/lecturers in the class. Please feel free to ask any questions via email through Moodle relevant to class material. Be respectful of students' posted questions or statements when framing your response. Students unable to take a test or submit an assignment on the scheduled date should contact the instructor in writing (email or text is acceptable – see the section on communication) before missing the scheduled due date. Alternate arrangements may be made depending on the situation with appropriate documentation, my fundamental goal is to have you succeed!

Accommodations: The university will accommodate students with special needs or limitations to the best of our ability and resources. Please notify the instructor of any special needs that you have relevant to this course.

Email Communication: Email is a very effective communication tool. For email communication to be used most effectively in this course, we will practice and enforce common etiquette and procedures that should be used for professional email communication. I recommend that you use your university-supplied email account because this reduces the possibility that your email message will be filtered. The following are some guidelines that should be used for any professional email message, including for this course. Place an appropriate subject in the subject line (for this course, the subject should be the course number) for every message. Please limit email questions to those that can be easily answered in a few sentences; more complicated questions may require a phone conversation or a longer timeframe to address. I will attempt to respond to email messages within one (1) business day (weekends and holidays do not count as business days).

Class Website: I will post lecture slides, required readings, links, or additional resources, and homework assignments on the course LMS, Moodle through MY MTECH website at <https://mtlbssso.mtech.edu/idp/profile/SAML2/Redirect/SSO?execution=e1s1> It is the student's responsibility to report any problems with Moodle (unfortunately inevitable) to the instructor and/or IT 406-496-4244 or ithelpdesk@mtech.edu. Make sure you have access to the Moodle site and also make sure that your email address is correct in Moodle. While I will use the class email to send notices, I prefer that you do not use the email

communication tool within Moodle to communicate with me; instead please send your message to my regular email dgilkey@mttech.edu.

Academic Integrity: Academic integrity is an important part of this class and your experience at the university. Academic integrity includes doing your work, studying, doing the assignments, and avoiding plagiarism (for more about plagiarism see the University Student Handbook: <https://www.mtech.edu/student-life/student-handbook.pdf>). Academic integrity also means doing your part for a group project. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, I will ask that you sign the Honor Pledge as part of completing all of your written assignments.

Class Participation: Students are expected to participate in group projects. Modifications to the course no longer include weekly discussions.

Class Assignments:

- 1) Each week you are expected to view the lecture, review the slides, complete assigned readings and/or additional multimedia posts and then prepare a short paper using ChatGPT on the directed topic. The short papers will total 100 points. Papers should be written at the graduate level and follow the APA style manual 6th or 7th Edition. Chat GPT is a powerful tool and I want students to harness the new technology.
- 2) OSH or PH Infographic: **“Each student”** is required to prepare an infographic that presents an effective OSH/IH site safety or environmental public health message. The infographic is worth 100 points and will be posted to the website. Free infographic tools are available on the internet and many good examples can be found. Infographics will be posted to the class website to share with others by 4/26. The rubric is posted on the website.
- 3) Group Project: You will be asked to work in groups of 2-3 members to complete the final project, which consists of a well-developed written paper due by 5/5 and posted presentation due by 4/26. Each group will select a topic that represents a site biological or environmental exposure that poses a risk to workers and community health. This topic must be approved by the instructor and once a topic is taken no other group may use that same topic. Topics should be discussed and selected early in the semester, ideas are posted on the website.

The final report should provide background on why and how your topic impacts site workers and environmental public health. Please include known or possible mechanisms of injury, a summary of any infectious, toxicological, and epidemiological studies available, an explanation of current practices and associated regulations and/or policies.

And finally, you will offer defensible solutions for policy and practice to protect workers

and the community. For this project, you should assume that you will be the group responsible for implementing and enforcing your recommendation; therefore, carefully consider how feasible your recommendation(s) is/are in the context of social, economic, political, and technological barriers. The rubric is posted on our class website.

- 4) **Examinations: (*Online testing will be open book/note*)**. There is mid-term examination covering approximately the first half of the course and a final examination that covers the second half of the course. The examinations are designed to include multiple-choice, true-false, or matching questions and can be taken multiple times to earn maximum points. Each examination will include 50 questions worth two points totaling 100 points. Students will be given 120 minutes during a designated period and are to work alone to complete the examination. Students may take the exam more than once to optimize their scores. Students are not to collaborate on tests.

Methods of Evaluation	Points
Weekly short papers (10 points each)	100
Infographic	100
Group Project and Presentation	100
Midterm Examination	100
Final Examination	100
Total Points	500

Course grades will be computed as a percentage of 500 points:

A = 90% (450 points or above)	B = 80% (400 - 549 points)
C = 70% (350 - 399 points)	D = 60% (300 - 349 points)
F = 59% (299 points or below)	

I will endeavor to post scores promptly, keep grade books current, and provide feedback as soon as possible. Scores will be posted on the class website, check your grade book. Please contact me if you would like to discuss your score(s) or review your examination or other work product, please review the rubric in advance.

Tentative Topic/Reading Schedule - (NOTE: this schedule may change – check Moodle for updates)

Week	Date	Topic	Readings / Presenter
1	1/8-1/12	Introduction to Advanced Environmental Health and Biological Site Safety and its role in Public and Occupational Health; Course Overview	Moodle- Links - Dr. Gilkey
2	1/15-1/19	Occupational, Environmental, and Public Health Policy	Moodle- Links - Dr. Gilkey
3	1/22-1/26	Air and water quality	Moodle - Links - Dr. Gilkey

4	1/29-2/2	Food Safety, Solid and hazardous waste	Moodle - Links - Dr. Gilkey
5	2/5-2/9	Chemicals, toxicology & risk assessment	Moodle - Links - Dr. Gilkey
6	2/12-2/16	Chemicals and Policy - TSCA / EPCRA / RCRA / FIFRA / CAA / CWA	Moodle - Links – Dr. Gilkey
7	2/19-2/23	Climate Change and OSH & PH threats	Moodle - Links - Dr. Gilkey
8	2/26-3/1	Radiation and Biological Hazards Mid-Term Examination - Online	Moodle - Links – Dr. Gilkey
9	3/4-3/8	Site Safety Plan and Biological Safety	Moodle - Links – Dr. Gilkey
10	3/20-3/26	Bioaerosol Sampling and Characterization	Moodle - Links – Dr. Gilkey
	3/13-3/19	Spring Break – Ski the Rockies	
11	3/25-3/29	Safe Site and Worker Hygiene Protection	Moodle - Links – Dr. Gilkey
12	4/1-4/5	Respiratory Protection, Donning and Doffing PPE	Moodle - Links – Dr. Gilkey
13	4/8-4/12	Decontamination, Sterilization, and Control Zones	Moodle - Links – Dr. Gilkey
14	4/15-4/19	Animals, Insects, and Plants BBP, First Aid and CPR	Moodle - Links – Dr. Gilkey
15	4/22-4/26	Group presentations posted to the website Infographics posted to the website	
16	Online	Final Examination 4/27-5/5	Open Book Online

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 fewer.
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:
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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:

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- Re-titling an existing postsecondary educational program. Required Documents:
 - Academic Proposal Request Form
- Terminating an existing postsecondary educational program.
 - Academic Proposal Request Form
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- Consolidating existing postsecondary educational programs
 - Academic Proposal Request Form
 - Curriculum Proposal Form
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- 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)**

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- 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
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 - Completed Intent to Plan Form
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Date 4/17/24

Dept. SHIH

Program MS IH Distance Learning/Professional Track

College Lance College

CRC Representative Roger Jensen

Description of Request: _____

Revise the name of the MS Industrial Hygiene Distance Learning/Professional Track degree to MS Industrial Hygiene Professional Track

Current Course or Program Information: _____

Current Degree Name: MS Industrial Hygiene Distance Learning/Professional Track

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
Degree name revised to: MS Industrial Hygiene Professional Track			

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

Since our MS Industrial Hygiene Distance Learning Professional Track degree program is ANSAC/ABET accredited, we surveyed our constituents including existing and current students. In addition, we reviewed with our External Advisory Board which includes alumni and employers. The support for the name change was substantial. The majority of students and former students surveyed reported that the name was too long and that there was a stigma associated with the "distance learning" component. No other ANSAC/ABET accredited primarily online MS IH program has the online or distance learning identifier associated with the program name.

Anticipated Impacts to "Other" Programs

None

Impact on Library: None _____ has consulted with Scott Juskiwicz _____ 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): 2024 calendar year _____

APPROVALS

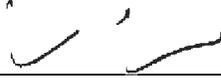
Department Head Approval

Date 4/17/24

Julie F. Hart

Dean Approval

Date 4/18/24



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

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- 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 April 17, 2024

Dept. Mechanical Engineering

Program BS in Mechanical Engineering

College Lance College of Mines and Engineering

CRC Representative Peter Lucon

Description of Request: _____

Drop EGEN 101 and 102 from prerequisite(s) for EMEC 215. Drop EGEN 324 and EMEC 320 in EMEC 402. Update curriculum to remove preferred language for Math Elective and add a preferred Humanities Elective.

Current Course or Program Information: _____

Provided below with all changes tracked.

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
EMEC 215	Introduction to Modeling for Mechanical Engineers	1 Credit	M172, EGEN 101 & 102
Change to: EMEC 215	Introduction to Modeling for Mechanical Engineers	1 Credit	M172
EMEC 402	Mechanical Engineering Laboratory	1 Credit	EGEN 324 or EMEC 320, EGEN 434, EMEC 326, and EMEC 455
Change to: EMEC 402	Mechanical Engineering Laboratory	1 Credit	EGEN 434, EMEC 326, & EMEC 455

Updated curriculum with the following:
Remove "preferred" language from Math Elective M333.
~~Added Preferred course of PHL 325W Professional Ethics in the 2nd semester of Freshman year.~~

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

During department meetings ABET program performance indicators (FE Exam topical results) showed Statistics and Ethics were topical areas needing improvement. Therefore, the Math Elective language was changed so STAT 332 (Statistics) and M 333 (Linear Algebra) are listed without preference for M 333. This, along with advising, will lead to more students taking Statistics. PHL 325W (Professional Ethics) is added as a preferred Humanities Elective to improve topical appreciation of ethical considerations as a professional. These changes will improve student topical knowledge and allow flexibility for students who are transferring into the program.

The prerequisites were modified because EGEN 102 is no longer offered, and EMEC 402 is now cleaned up with only EGEN 434 listed instead of EGEN 324 or EMEC 320.

Anticipated Impacts to “Other” Programs

An increase in enrollment in STAT 332 and PHL 325W is expected.

Impact on Library: None has consulted with Scott Juskievicz 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): 2024-2025

Montana State

Curriculum Change Request Form Dated December 23, 2022

APPROVALS

Department Head Approval

Date 4/17/2024

Jak L. Skinner

Dean Approval

Date 4-18-24

LL

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

CURRICULUM WORKSHEET

Mechanical Engineering		Name:									
Fall 2024		Advisor:								Date:	
Semester	Course #	Course Title	Semester	Grade	Credits	Math/Sci	Eng Sci	Design	HSS	Other	Total
Freshman First Semester	CHMY 141	College Chemistry I			3	3					
	CHMY 142	College Chemistry Lab I			1	1					
	EGEN 101	Intr Eng Calc & Probs			3		3	D			
	EGEN 194	Intr Eng Seminar			1		1				
	M 171	Calc I			3	3					
	WRIT 1XX	¹ Writing Elective			3					3	
		Humanities Elective			3				3		17
Freshman Second Semester	CHMY 143	College Chem II			3	3					
	CHMY 144	College Chem Lab II			1	1					
	EMEC 215	Intro to Mech CAD Modeling			1		1	D			
	M 172	Calc II			3	3					
	PHSX 234	Gen Phys-Mechanics			3	3					
	CSCI 1XX	³ Programming Elective			3					3	
		⁶ Humanities Elective			3				3		17
Sophomore First Semester	EGEN 201	Engr Mechanics-Statics			3		3				
	EGEN 213	Survey of Met & Mat Eng			3		3				
	M 273	Multivariable Calc			4	4					
	PHSX 235	Gen Phys-Heat, Sound & Optics			3	3					
	PHSX 236	Gen Phys-Heat, Sound & Optics Lab			1	1					
	EELE 201	Circuits I for Engineering			3		3				
	EELE 202	Circuits I for Engineering Lab			1		1				18
Sophomore Second Semester		² Free Elective			4					4	
	EGEN 202	Dynamics			3		3				
	EGEN 305	Mech of Materials			3		3				
	EGEN 306	Mech of Materials Lab			1		1				
	M 274	Introduction to Diff Equations			3	3					
	PHSX 237	Gen Phys-Ele, Magn & Motion			3	3					
	PHSX 238	Gen Phys-Ele, Magn & Motion Lab			1	1					18
Junior First Semester	EMEC 320	Thermodynamics			3		3				
	EMEC 341	*Adv. Mechanics of Materials			3		3	D			
	EGEN 318	Comp Apps for Engineering Design			2		2	D			
	EGEN 335	Fluid Mechanics			3		3				
	EGEN 336	Fluid Mechanics Lab			1		1				
		⁵ Math Elective			3	3					
		#Professional Electives, 300 or higher			3		3				18
Junior Second Semester	EGEN 434	*Applied Thermodynamics II			3		3	D			
	WRIT 321	Advanced Technical Writing			3					3	
	EELE 320	Process Instr & Control & Lab			4		4	D			
	EMEC 455	*Mech Component Design			3		3	D			
			#Professional Electives, 300 or higher			3		3			
Senior First Semester	EGEN 325	Engineering Economic Analysis			3		3				
	EGEN 489	Engineering Design I			2		2	D			
	EMEC 326	*Fundamentals of Heat Transfer			3		3	D			
	EMEC 445	Mechanical Vibrations			3		3	D			
			#Professional Electives, 300 or higher			2		2			
		#Professional Electives, 300 or higher			3		3				16
Senior Second Semester	ECNS 2XX	⁴ Economics Elective			3				3		
	EELE 355	Electric Machine Fundamentals			3		3				
	EGEN 488	Fundamentals of Engineering Exam			1		1				
	EGEN 499W	Engineering Design II			2		2	D			
	EMEC 402	Mech Engineering Lab			1		1				
			#Professional Electives, 300 or higher			3		3			
		Social Science Elective			3				3		16
					136	35	76		12	13	136

¹Writing Elective is either WRIT 101 or 121 with 121 preferred.

²Free Electives are 1XX and higher. COMX 111 (Intro to Public Speaking) recommended. HPER credits are limited to 1 credit.

³Programming Elective is either CSCI 112, 117, or 135 with 117 preferred.

⁴Economics Elective is either ECNS 201, 202, or 203 with 203 preferred.

⁵Math Elective is either M 333 (Linear Algebra) or STAT 332 (Statistics) ~~with M333 preferred.~~

⁶Humanities Elective - PHL 325W - Professional Ethics preferred.

Note: Upto 3 credits of Internship (EMEC 498) may be used as Professional Electives.

*This course is designated as a Core Class.

#Professional Electives are specifically listed below and include one of the following Focus Areas:

Control Systems: EELE 203, EELE 321, EELE 421, M426

Nanotechnology: EELE 203, CHMY 371, EELE 321, EGEN 474, EMAT 351

Mechanical Design: EMEC 448, EMEC 457, EMEC 322, EMEC 415

Welding: EMAT 351, EMAT 353, EWLD 314, EWLD 340, EWLD 341, EWLD 440, EWLD 476, EWLD 488

The following Professional Electives are approved:

CHMY 371 Physical Chemistry - Quantum Chemistry and Spectroscopy

EELE 203 Circuits II for Engineering

EELE 308 Signals and Systems Analysis

EELE 321 Intro to Feedback Control

EELE 421 Feedback Control II

EGEN 474 Introduction to Micro/Nanoelectromechanical Systems

EGEN 492 Aerospace Propulsion

EMAT 351 Fundamentals of Materials

EMEC 322 Product Development

EMEC 415 Impact Dynamics

EMEC 429 Mechanical Component Design Lab

EMEC 435 Rocket Propulsion

EMEC 448 HVAC

EMEC 457 Kinematics

EMEC 490 Undergraduate Research/Instruction

EMEC 491 Special Topics

EMEC 492 Independent Study

EMEC 498 Internship (Maximum of 3 credits)

ENGR 571Q Advanced Fluids

EWLD 314 Intro to Welding Engineering

EWLD 340 Welding Process Applications

EWLD 341 Welding Process Applications Lab

EWLD 440 Design of Welded Connections

EWLD 443 Physics of Welding

EWLD 444 Physics of Welding Lab

EWLD 475 Robotics and Automated Welding

EWLD 476 Nondestructive Examination

3 credits maximum allowed from the following Project Management courses:

MIN 458 Mine Management

MPEM 5020 Project and Engineering Management

3 credits maximum allowed from the following math/statistics classes:

M 405 Advanced Engineering Mathematics I

M 410 Numerical Computing for Engineering and Science

M 426 Mathematical Modeling

M 435 Advanced Calculus I

STAT 421 Probability Theory

STAT 432 Regression and Model Building

EMEC 215 COURSE SYLLABUS
INTRODUCTION TO MECHANICAL CAD MODELING

Class Schedule: Th 2:00 – 4:50 pm, SE 308

Instructor: G. Steve Tarrant

Office hours: SE 310, by appointment

Email: starrant@mtech.edu

Prerequisite(s): M 172, ~~EGEN 101, & EGEN 102~~

COURSE OBJECTIVE: This course will provide an introduction to the basic use of the Solidworks CAD software, which is commonly the software of choice in mechanical engineering environments. A short introduction to Mathcad will also be covered. Topics covered will include 2D and 3D modeling of parts, creation of simple engineering drawings, and construction of assemblies in Solidworks. MathCad topics will cover basic calculations, simple programs, graphing, and solving equations.

HOMEWORK: There will be one homework assignment for each class during the semester. The average of the homework assignments will make up 100% of the final course grade.

Assignments must be completed and turned in before the end of class period (4:50 pm). All assignments must be submitted on the course's Moodle page. No late submissions will be accepted.

Although it is acceptable for students to work together on the assignments, each student must submit his or her own work. Assignments turned in by multiple students with identical files are subject to loss of points or a failing grade for that assignment. Do your own work.

QUIZZES: There will be no quizzes or exams. There will be no final exam.

COURSE GRADE: Homework 100%

GRADING:	90 – 100%	A
	80 – 89%	B
	70 – 79%	C
	60 – 69%	D
	<60%	F

Any form of dishonesty or cheating will not be tolerated. Dishonesty will result in an automatic course failure.

Group study can be a valuable learning approach for homework, where students can discuss the problems with the objective of understanding them. This is a lab, and working together is expected and encouraged. Learning and understanding the problems is ultimately up to you, however, and this is your responsibility as a student. Each student must do his or her own work and turn it in under his or her name. Do not collaborate with other students and submit the same files that they do.

The course is directed toward specific goals and outcomes, identified by the Accreditation Board for Engineering and Technology (ABET). These goals are given below.

ABET Outcomes

8. The knowledge and application of basic science, advanced mathematics including multivariate calculus and differential equations, and principles of engineering; to model, analyze, design and realize physical systems, components, or processes
 - d. Have and apply knowledge to design, analyze, and realize physical systems, components or processes

Approximate schedule of topics for the course:

Aug 21-25	Introduction, course logistics
Aug 28-Sept 1	Creating a Part in Solidworks, Sketch mode, tools Using the Boss Extrude and Cut Extrude tools Sketch relations, Draft feature, Hole Wizard
Sept 4-8	Monday, Sept. 4 Labor Day Holiday Creating an Assembly in Solidworks Geometric constraints using Mates
Sept 11-15	Using the Loft, Revolve, and Sweep tools for a Solidworks part
Sept 18-22	Using the Dynamic Mirror, Mirror, Linear Patterns, Circular Patterns for a Solidworks part
Sept 25-29	Using Design Tables for Solidworks parts Interface with Microsoft Excel
Oct 2-6	Visualization and Animation with Solidworks models Using eDrawings for communication
Oct 9-13	Using the Hole Wizard and Toolbox in Solidworks assemblies
Oct 16-20	Creating a Drawing in Solidworks Drawing basics – simple, readable, reference dims
Oct 23-27	Creating Section Views for Solidworks models Determining mass properties, centroids, etc.
Oct 30-Nov 3	Exploded views, equations
Nov 6-10	Friday, Nov. 10, Veterans Day Holiday Basic MathCad calculations MathCad spreadsheet guidelines, graphing
Nov 13-17	Using MathCad to solve equations Graphing solutions to equations
Nov 20-24	Wed-Fri, Nov. 22-24, Thanksgiving Break
Nov 27-Dec 1	Basics of programming in MathCad
Dec 4-8	NO FINAL EXAM

This syllabus is subject to change, depending upon schedule and course progress.

Spring 2024

EMEC 402 Mechanical Engineering Lab
Montana Technological University
Mechanical Engineering Department

COURSE SYLLABUS

COURSE NUMBER AND TITLE: EMEC 402, Mechanical Engineering Lab

DATE REVISED: Spring 2024

MEETS: 2:00PM to 5:00PM. NRRC 115, Section 11 on Tuesday and Section 12 on Wednesday.

TEXT: Labs will be on Moodle.

SEMESTER CREDITS: 1

PREREQUISITE OR COREQUISITE: ~~EGEN 324~~, EGEN 434, EMEC 326, and EMEC 455 (or EMEC 341)

INSTRUCTORS NAMES: Scott Coguell and Jack Grochowski

PHONE NUMBER: 406-496-4734

OFFICE LOCATION: NRRC 212

OFFICE HOURS: by appointment only

COURSE OBJECTIVES:

Covers practical application and experimentation in the areas of energy conversion, heat transfer, power cycles, HVAC, dynamics, kinematics, vibration analysis and balancing.

COURSE DESCRIPTION:

The course will utilize a variety of Mechanical Engineering experiments to develop general purpose experimental protocols including the development of test plans, measurement techniques, and test reports.

REQUIRED TEXT:

The lab handouts will be on Moodle, and will be downloaded and printed by the students.

COURSE GRADING

Grades are a function of the student's ability to prepare for lab, collect data and formalize a test report when addressing specific problems posed in a variety of Mechanical Engineering disciplines. The report format is listed below. Students will be working individually and will ultimately be scored out of a 100-total point as follows:

Reports	95 pts
Safety	5 pts

Spring 2024

Only university excused absences will allow an opportunity to make-up for a missed lab. The letter grade system shown below will be used:

100 %	93%	A
92 %	90 %	A-
89 %	87 %	B+
86 %	83 %	B
82 %	80 %	B-
79 %	77 %	C+
76 %	73 %	C
72 %	70 %	C-
69.%	67 %	D+
66 %	60 %	D
59%	0 %	F

LAB REPORT FORMAT AND GRADING

A lab report format guide will be supplied.

DISABILITIES: Montana Tech provides reasonable accommodations to students who are registered with Disability Services. If you have been diagnosed with or believe you may have a disability, contact Disability Services to discuss accommodations, access needs, and obtain an Accommodation Letter. You can reach the Disability Services Coordinator via email at sgoodell@mtech.edu, by phone at 406-496-4428, or in person in the Academic Center for Excellence (ACE) within the Student Success Center (SSC). All services are confidential. Once you have received your letter, please meet with me to discuss your access needs.

If you have any conditions that would endanger yourself or others while working on machinery, let me know.

SAFETY POLICY:

Completion of the on-line safety course is mandatory. There are many ways to hurt yourself and/or others in any lab. Safety is to be considered at all times, and no safety rules can be compromised. Disregarding safety practices, endangering yourself or others in the lab or acting carelessly around the equipment will result in removal from the class and denial of lab access.

Eye protection is mandatory at all times in the lab area. Students will be working with pressurized gas, steam, hot water, electric motors, and vibrating instruments.

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 fewer.
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 04/09/2024

Dept. Civil Engineering

Program B.S. Construction Management

College Lance College of Mines and Engineering

CRC Representative Dr. Liping Jiang

Description of Request: _____

1. Requesting to replace the social science elective with the free elective 2. Requesting to add ECIV499W Capstone: Civil Engineering Design and to adjust the required credits to 3

Current Course or Program Information: _____

1. Both COMX415 and ECNS201 are required courses in the current curriculum, fulfilling the general education requirements. 2. current required course: ECIV499W Capstone: Civil Engineering Design II

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
ECIV 499W	Capstone: Civil Engineering Design Engineering/Construction Management major, instructor's consent	1-3	Senior Standing, Civil
Catalog Description: Students will be able to partake in and complete a capstone engineering design that requires students to apply engineering principles to industry or C.E. department-sponsored projects that are selected by the instructor with the department head's approval. Students will be assigned to teams and contribute to engineering projects that require multiple constraints.			
Student outcomes: Successfully complete an engineering-related team project; explain basic concepts in project management, business, public policy, and leadership; explain basic concepts in leadership.			
Prerequisite(s): Civil Engineering or Construction Management Major, Senior Standing, Instructor's consent			
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

update and correction

Anticipated Impacts to “Other” Programs

NA

Impact on Library: none 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): 2024 Fall

APPROVALS

Department Head Approval

Date 04/18/2024

 _____

Dean Approval

Date 04/18/2024

 _____

Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Current

Freshman		
Fall Semester		
Course Name	Credits	
EGEN 101 - Introduction Engineering Calculations & Problem Solving	3 credits	
EGEN 104 - Freshman Engineering Seminar	1 credit	
Humanities Elective	3 credits	
WRIT 101 - College Writing I /WRIT 121 - Introduction To Technical Writing	3 credits	
M 121 - College Algebra /M 151 - Pre-calculus/Math Elective	3/4/3 credits	
Total: 13-14		
Spring Semester		
Course Name	Credits	
ECIV 102 - Introduction to Civil Engineering & Construction Management	2 credits	
ECIV 100 - Construction CAD	3 credits	
COMX 290 - Presenting Technical Information	3 credits	
Humanities Elective	3 credits	
M 151 - Pre-calculus/Free Elective	4/3credits	
Total: 14-15		
Sophomore		
Fall Semester		
Course Name	Credits	
ECIV 210 - Construction Materials	3 credits	
ACTG 201 - Principles of Financial Accounting	3 credits	
OSHI 224 - Safety and Health Occupations and Programs	3 credits	
MIN 205 - Mining and Construction Equipment	3 credits	
CHEM 141 - College Chemistry I and CHEM 142 - College Chemistry Laboratory I /GEO 101 - Introduction to Physical Geology	6 + 1/3 credits	
Total: 15-16		
Spring Semester		
Course Name	Credits	
OSHI 226 - Safety Engineering & Technology	3 credits	
ACTG 202 - Principles of Managerial Accounting	3 credits	
ECNS 201 - Principles of Microeconomics	3 credits	
STAT 216 - Introduction to Statistics	3 credits	
Free Elective	3 credits	
Total: 15		
Junior		
Fall Semester		
Course Name	Credits	
ECIV 310 - Computer Applications in Construction	3 credits	
BMGT 299 - Human Resource Management	3 credits	
PHSX 121 - Fundamentals of Physics I	4 credits	
MIN 210 - Plane Surveying	3 credits	
Free Elective	3 credits	
Total: 16		
Spring Semester		
Course Name	Credits	
ECIV 306 - Construction Engineering	3 credits	
OSI 324 - Construction Safety	3 credits	
COMX 415 - Intercultural Communication	3 credits	
WRIT 321W - Advanced Technical Writing	3 credits	
Free Elective 3 credits		
Total: 15		
Senior		
Fall Semester		
Course Name	Credits	
ECIV 407 - Building Inspections	3 credits	

New - with changes highlighted

Freshman		
Fall Semester		
Course Name	Credits	
EGEN 101 - Introduction Engineering Calculations & Problem Solving	3 credits	
EGEN 104 - Freshman Engineering Seminar	1 credit	
Humanities Elective	3 credits	
WRIT 101 - College Writing I /WRIT 121 - Introduction To Technical Writing	3 credits	
M 121 - College Algebra /M 151 - Pre-calculus/Math Elective	3/4/3 credits	
Total: 13-14		
Spring Semester		
Course Name	Credits	
ECIV 102 - Introduction to Civil Engineering & Construction Management	2 credits	
ECIV 100 - Construction CAD	3 credits	
COMX 290 - Presenting Technical Information	3 credits	
Humanities Elective	3 credits	
M 151 - Pre-calculus/Free Elective	4/3credits	
Total: 14-15		
Sophomore		
Fall Semester		
Course Name	Credits	
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ACTG 201 - Principles of Financial Accounting	3 credits	
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Course Name	Credits	
ECIV 306 - Construction Engineering	3 credits	
OSI 324 - Construction Safety	3 credits	
COMX 415 - Intercultural Communication	3 credits	
WRIT 321W - Advanced Technical Writing	3 credits	
Free Elective 3 credits		
Total: 15		
Senior		
Fall Semester		
Course Name	Credits	
ECIV 407 - Building Inspections	3 credits	

ECIV 402 - Sustainable Engineering	3 credits
OSH 323 - Fire Protection	3 credits
Free Elective	3 credits
Free Elective	3 credits
Total: 15	
Spring Semester	
Course Name	Credits
ECIV 499W - Capstone: Civil Engineering Design II	1 credit
ECIV 410 - Construction Methods & Cost Management	3 credits
OSH 444 - Law and Ethics for OSH	2 credits
Social Science Elective	3 credits
Free Elective	3 credits
Total: 15-17	1-3 credits
Minimum credits for a B.S. degree in Construction Management: 120	
Notes:	

ECIV 402 - Sustainable Engineering	3 credits
OSH 323 - Fire Protection	3 credits
Free Elective	3 credits
Free Elective	3 credits
Total: 15	
Spring Semester	
Course Name	Credits
ECIV 499W - Capstone: Civil Engineering Design	3 credit
ECIV 410 - Construction Methods & Cost Management	3 credits
OSH 444 - Law and Ethics for OSH	2 credits
Free Elective	3 credits
Free Elective	3 credits
Total: 15-17	1-3 credits
Minimum credits for a B.S. degree in Construction Management: 120	
Notes:	

ECIV 499W – Civil Engineering Design

- **Course Description:** Students will be able to partake in and complete a capstone engineering design that requires students to apply engineering principles to industry or C.E. department-sponsored projects that are selected by the instructor with the department head's approval. Students will be assigned to teams and contribute to engineering projects that require multiple constraints.
- **Course Objective:** This course is aimed at providing students with guidance to complete civil engineering design projects; explain basic concepts in project management, business, public policy, and leadership; explain basic concepts in leadership.
The student is expected to achieve;
 - An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
 - An ability to communicate effectively with a range of audiences
 - An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
 - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
 - An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
- **Credits:** 1 to 3 credits
- **Prerequisites:** Civil Engineering/Construction Management Major, Senior Standing, Instructor's consent
- **Time and Location:** TBD
TBD
- **Textbook:** *Handout*
- **Instructors:** Civil Engineering Faculty

• Course Grading:

Tentative Point Distribution

Biweekly Meeting Minutes	10%
Homework	20%
Proposal and Presentation	20%
Final Presentation	25%
Final Report	25%

Grading Scale

Grade	Score (%)
A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	< 60

Tentative Course Outline

Topic
Introduction
Teamwork and Leadership
Development of Proposal
Project Management
Proposal Presentation
Preparation of Poster Presentation
Technical Writing: Literature Review
Technical Writing: Methodology
Technical Writing: Tables and Figures
Technical Writing: Results
Design Requirement and Constraints: Standard Specifications
Globalization in Design
Sustainable and Resilient Design
Risk Management
Engineering Ethics
Health and Safety
Final Presentation
Final Report

Course Policy and Suggestions

Attendance Policy

- Students are expected to attend class regularly. However, attendance will not be formally recorded. Habitual tardiness will not be tolerated.

Homework Policy

- A due date and time will be indicated on each homework. **Homework submitted late will be penalized** as follows: 0-24 hours late: 25% penalty; 24-48 hours late: 50% penalty; 48+ hours late: 100% penalty. Exceptions may be made in cases where the student has spoken to the instructor prior to the due date of the homework or cases where there is a valid excuse (e.g., medical emergency with written proof).

Grading Policy

- Same grading policy will be applied to all students, **regardless of credit (either 1 or 3 credit)**.
- For interdisciplinary project, civil engineering students will be graded by the instructor (civil engineering faculty). The project mentor (in different department) may request additional deliverables, which will **not** be part of your grade.
- All projects and deliverables, including presentations and reports, are expected to meet the “ABET Senior Design Requirement” (See below).

ABET Definition-Engineering Design

“Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.”

- Engineering design typically includes both analysis and synthesis. Analysis without synthesis is not design
- Students should have some iterative design in the curriculum, but not all design experiences need be iterative
- Engineering design does not necessarily involve the devising of a complete system; a component or subsystem constitutes an acceptable design experience
- Students should have exposure to design problems that are incompletely defined and open-ended
- Exposure should be in at least two civil engineering contexts
- Engineering standards and realistic constraints are critical in civil engineering design; the program must show that standards and codes are taught and applied

General Policy

- Any student who needs special accommodations should notify the instructor within the first week of class. Montana Tech provides reasonable accommodations to students who are registered with Disability Services. If you have been diagnosed with or believe you may have a disability, contact Disability Services to discuss accommodations, access needs, and obtain an Accommodation Letter. You can reach the Disability Services Coordinator **Shauna Goodell via email at sgoodell@mtech.edu**, by phone at 406-496-4428, or in person in the Academic Center for Excellence (ACE) within the Student Success Center (SSC). All services are confidential. Once you have received your letter, please meet with me to discuss your access needs.
- Please make your cell phone silent during classes.

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.

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

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- 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):

OCHE Sprint Degree Program-Accelerated Construction Management B.S.

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 fewer.
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 04/09/2024

Dept. Civil Engineering

Program B.S. Construction Management

College Lance College of Mines and Engineering

CRC Representative Dr. Liping Jiang

Description of Request: _____

Requesting to addition of two more paths for B.S. Construction Management so that students participating in the OCHE Sprint Degree program can complete their degree in either 3.5 or 3 years.

Current Course or Program Information: _____

The current B.S. Construction Management curriculum is designed for a 4-year degree completion.

Number (Assigned By CRC): _____

Proposed Change

Course #	Name	Credits	Pre-req.
	At the bottom of all 3 BS CS options: "Minimum credits for a B.S. degree in Constructing Management: 120"		
	At the top of the 3.5 year program: Approved transfer coursework, including Dual Enrollment, Advanced Placement, and/or summer enrollment, may be required to fulfill the 120-credit requirement within 3.5 years.		
	At the top of the 3 year program: Approved transfer coursework, including Dual Enrollment, Advanced Placement, and/or summer enrollment, is required to fulfill the 120-credit requirement within 3 years.		

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

The new construction management program meets high industry demands. As the only B.S. Construction Management degree in Montana, this program will significantly enhance the state's construction industry. It offers three distinct paths, each tailored to enable students to graduate within four years (path 1), three and a half years (path 2), and three years (path 3). Path 2 and 3 are designed for the MUS Sprint Accelerated Degree Program.

Anticipated Impacts to "Other" Programs

NA

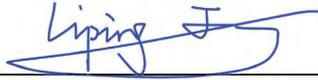
Impact on Library: none has consulted with _____ at the Montana Tech library to ensure needed materials and media are available. (Or No consultation is required since changes are only in the course number, course name, or course pre-requisites.)

Date to take effect (note that the earliest date is the next calendar year): 2024 Fall

APPROVALS

Department Head Approval

Date 04/17/2024



Dean Approval

Date 04/17/2024



Graduate Council Approval

Date _____

CRC Approval

Date _____

Faculty Senate Approval

Date _____

VCAA Approval (see below)

Date _____

Chancellor Approval (see below)

Date _____

Protocol: The department requesting curriculum change holds a discussion at the departmental level, and if agreed upon by the department head, discuss with the Dean for approval. Forward the completed form along with supporting information to the CRC chair after approval from the department head, dean, and graduate council if necessary. Final changes are then made by the registrar after faculty senate approval. Guidance: <https://www.umd.edu/provost/faculty/curriculum/default.php>.

Date 09/02/2020

Dept. Geological Engineering

College SME

Program: Geological Engineering

Description of Request/Summary:

We are proposing a new minor in geotechnical engineering to provide an avenue for students interested in the geotechnical field to pursue relevant coursework and acknowledge the emphasis on their transcripts, and also to provide more visibility for the geotechnical expertise on campus (which typically resides within a civil engineering department, but at Montana Tech, resides within the Department of Geological Engineering). The construction industry and the civil and mining engineering fields have career paths for geotechnical engineers.

Current Course Program Information: Does not exist (new minor)

Proposed Change (Attach syllabus or curriculum for new course or curriculum changes.)

Course # Name	Credits	Pre-req.
Course Requirements: 18 credits minimum from the following lists of required and elective courses		
Required Courses: 12-13 credits		
GEO 101 - Introduction to Physical Geology 3 credits		
Soil Mechanics or Geotechnical Engineering with Lab (3-4 credits), for example:		
ECIV 486 – Soil Mechanics & Foundation Design 3 credits, plus		
ECIV 487—Soil Mechanics Lab 1 credit		
GEOE 440 – Engineering Geology 3 credits		
GEOE 542 – Slope Stability Analysis & Design 3 credits		
Elective Courses:		
GEOE 420 - Hydrogeology For Engineers 3 credits		
GEOE 449 - Field Geotechnical Engineering 2 credits		
GEOE 541 – Advanced Engineering Geology 3 credits		
GEOE 54X – Geotechnical Modeling 3 credits		
GEOE 490/590 – Geotechnical Special Topics (variable credit, 3 credits maximum can count toward the minor)		
MIN 467 – Geomechanics 3 credits		
MIN 4xx or 5xx—Tunneling 3 credits		

List of supporting documentation attached: None

Assessment Leading to Request

The hydrogeology minor has become very popular and has attracted students from other majors to take the required coursework in order to serve their academic and career interests. We hope that the proposed geotechnical minor will do the same.

Anticipated Impacts to “Other” Programs

We anticipate that the geotechnical minor will provide enhanced career options for students from outside departments.

Impact on Library: XXXXXXXXXXXX has consulted with XXNameXX (XX/XX/XX) 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.)

NOT NEEDED, Excellent library resources are already in place for all of the courses listed.

Date to take effect: 01/01/2021

LEVEL of Request

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

Faculty Approvals (directly to CRC, then Faculty Senate):

- Establish a new course for the catalog (please contact the Registrar of MUS CCN information)
- Changed course: addition, deletion or change of title, credit, course number, pre-req, description, or cross listing.
- 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
- New degree certification of 29 credits or less
- Other:

Campus Approvals (must be approved by the VCAA prior to CRC submission):

- Placing a postsecondary educational program into moratorium
- Withdrawing a postsecondary educational program from moratorium
- Establishing, re-titling, terminating or revising a campus certificate of 29 credits or more
- Establishing a B.A.S./A.A./A.S. area of study
- Offering an existing postsecondary educational program via distance or online delivery
- Other:

OCHE Approvals (must be approved by the VCAA and Chancellor prior to CRC submission):

- Re-titling an existing postsecondary educational program
- Terminating an existing postsecondary educational program
- Consolidating existing postsecondary educational programs
- Establishing a new minor where there is a major or an option in a major
- Revising a postsecondary educational program
- Establishing a temporary C.A.S. or A.A.S. degree program Approval limited to 2 years
- Other:

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

- Establishing a new postsecondary educational program
- Exceeding the 120 credit maximum for baccalaureate degrees Exception to policy 301.11
- Forming, eliminating or consolidating an academic, administrative, or research unit
- Re-titling an academic, administrative, or research unit
- Other:

APPROVALS

Department Head Approval _____ Date _____

Dean Approval _____ Date _____

Graduate Council Approval _____ Date _____

CRC Approval _____ Date _____

Faculty Senate Approval _____ Date _____

VCAA Approval (see above) _____ Date _____

Chancellor Approval (see above) _____ Date _____