APPROVAL FORM FOR

DEGREE PROGRAMS

MISSISSIPPI STATE UNIVERSITY

NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the *Guide and Format for Curriculum Proposals* published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.

College: Arts & Sciences **Department: Geosciences**

Contact Person: Andrew Mercer **Mail Stop: 9537** **E-mail: aem35@msstate.edu**

Nature of Change: Addition and removal of several courses to each of the concentrations for the Geosciences undergraduate degree programs. Changes requested by College of Arts & Sciences to university and college core courses to ensure consistency among departments within the college.

Date Initiated: September 7, 2022 **Effective Date: Fall 2023**

Current Degree Program Name: Bachelor of Science **Major: Geosciences**
New Degree Program Name: Bachelor of Science **Major: Geosciences**

Summary of Proposed Changes:

The College of Arts & Sciences made several primarily wording changes to the listings in the university and college core curriculum, which are seen in the accompanying table. Additionally, anticipating the eventual requirement of only 3 hours of math towards the core (where MA 1313 does not count), some degree programs were modified to only require MA 1323 Trigonometry and those hours were redistributed elsewhere. Also, GR 1114 Physical Geography was split into GR 1113 Physical Geography and GR 1111 Physical Geography Laboratory (course proposals were submitted concurrently with this change). In addition, by concentration:

Concentration: Professional Geology

- **Modified GR 4124 Petrology to be a 4 hour course**
- **Modified GR 4414 Structural Geology to be a 4 hour course**
- **Modified GR 1113 Weather and Climate to only require the lecture section**
- **Reduced the total required course hours to 120**

Concentration: Environmental Geoscience

- **Modified GR 1604 to GR 1133 and GR 1131, Weather and Climate and Weather and Climate laboratory**

- **Added GR 4113 Political Ecology as a new possible Geosciences elective within the concentration.**
- **Added a requirement for either GR 3113 Conservation of Natural Resources or GG 3133 Introduction to Environmental Geology.**
- **Modified the statistics requirement to only MA 2113 Introduction to Statistics.**
- **Added a requirement for Principles of GIS.**
- **Modified the concentration elective hours and general elective hours to reflect updates.**

Concentration: Geography

- **Modified GR 1604 to GR 1133 and GR 1131, Weather and Climate and Weather and Climate laboratory**
- **Modified the statistics requirement to only MA 2113 Introduction to Statistics.**
- **Added GR 4113 Political Ecology as a new possible Geosciences elective within the concentration**

Concentration: Broadcast Meteorology

- **Modified GR 1604 to GR 1133 and GR 1131, Weather and Climate and Weather and Climate laboratory**
- **Added GR 3011 Weather Analysis**
- **Changed GR 4422 and GR 4432 Forecasting I and II to their new 3-hour versions, GR 4423 and GR 4433 Weather Forecasting I and II**
- **Removed GR 4623 Physical Meteorology and added GR 4693 Physical Meteorology and Climatology II**
- **Added CO 2413 Intro to News Writing as a core requirement**
- **Added GR 4563 Aviation Meteorology as a possible geoscience elective**
- **Reduced the required geoscience elective hours from 12 to 9**
- **Reduced the specified elective hours from 14 to 11**

Concentration: Professional Meteorology

- **Modified GR 1604 to GR 1133 and GR 1131, Weather and Climate and Weather and Climate laboratory**
- **Added GR 3011 Weather Analysis**
- **Changed GR 4422 and GR 4432 Forecasting I and II to their new 3-hour versions, GR 4423 and GR 4433 Weather Forecasting I and II**
- **Removed GR 4623 Physical Meteorology and added GR 4693 Physical Meteorology and Climatology II**
- **Added MA 2743 Calculus IV as a requirement**
- **Added GR 4563 Aviation Meteorology as a possible geoscience elective**
- **Reduced the required geoscience elective hours from 12 to 9**
- **Reduced the specified elective hours from 20-21 to 18**
- **Removed suggested concentrations as they are outdated and not utilized**

Concentration: Geographic Information Systems (GIS)

- **Modified GR 1604 to GR 1133 and GR 1131, Weather and Climate and Weather and Climate laboratory**

- Added GR 4373 Web GIS as a required core course
- Modified PSS 4411 Remote Sensing Seminar to the cross-listed GR 4411 course with the same title
- Reduced General electives from 9-12 hours to 7-9

Concentration: Broadcast Meteorology (Distance Learning Only)

- Modified GR 1604 to GR 1133 and GR 1131, Weather and Climate and Weather and Climate laboratory

Approved:	Date:
John Rodgers, Professor and Head Digitally signed by John Rodgers, Professor and Head Date: 2022.09.20 09:37:53 -05'00'	September 20, 2022
Department Head	
	11/1/2022
Chair, College or School Curriculum Committee	
	11-1-22
Dean of College or School	
Chair, University Committee on Courses and Curricula	
Chair, Graduate Council(if applicable)	
Chair, Deans Council	

2. Degree Modification Outline Form

CURRENT Degree Description	PROPOSED Degree Description
Degree: Bachelor of Science Major: Geosciences	No change
B.S. and M.S. degrees in Geoscience and a PhD in Earth and Atmospheric Sciences are offered with emphasis in sub-disciplines described below. Minors are offered at both B.S. and M.S. levels in Geoscience. The Department of Geosciences strives for an integrated, interdisciplinary study of the whole Earth from the bachelor's through the Ph.D. levels. Course offerings are grouped into six areas of emphasis: 1. Professional Geology - physical, biological, and chemical aspects of the Earth; 2. Geography - distribution of physical features and human interaction with the Earth; 3. Environmental Geoscience - conservation and management of Earth resources and remediation of natural and human hazards; 4. Broadcast Meteorology/Climatology - radio/television weathercasting; 5. Professional Meteorology/Climatology - atmospheric processes and climatic variability; and 6. Geographic Information Systems - spatial analysis and topological relationships of geographic data. Within the six areas of emphasis outlined above, a student may further focus interests in a variety of areas including: water resources, hydrogeology and environmental clean-up and monitoring, petroleum exploration and services, construction and urbanization involving geological applications, geophysics and geochemistry, sedimentary geology and paleontology, Quaternary geology and karst processes, Geographic Information Systems, human or physical geography, or analysis and prediction of weather and climate. A minimum of 40 credit hours in geoscience courses is required for the geoscience degree. A grade of C or higher is required on all departmental courses to satisfy graduation requirements. Students in the professional geology concentration are required to take the Association of State Board of Geologists Fundamentals of Geology (ASBOG-FG) exam. A minor in geoscience consists of a minimum of 14 credit hours in courses numbered 2000 and above, in addition to the first year courses. The following are examples of variations within a geoscience minor. A minor with a Geology emphasis should include physical (GG 1113/GG 1111) and historical geology (GG 1123/GG 1121) plus 14 hours 2000 and above for a total of 22 hours; for an Environmental Geoscience	B.S. and M.S. degrees in Geoscience and a PhD in Earth and Atmospheric Sciences are offered with emphasis in sub-disciplines described below. Minors are offered at both B.S. and M.S. levels in Geoscience. The Department of Geosciences strives for an integrated, interdisciplinary study of the whole Earth from the bachelor's through the Ph.D. levels. Course offerings are grouped into six areas of emphasis: 1. Professional Geology - physical, biological, and chemical aspects of the Earth; 2. Geography - distribution of physical features and human interaction with the Earth; 3. Environmental Geoscience - conservation and management of Earth resources and remediation of natural and human hazards; 4. Broadcast Meteorology/Climatology - radio/television weathercasting; 5. Professional Meteorology/Climatology - atmospheric processes and climatic variability; and 6. Geographic Information Systems - spatial analysis and topological relationships of geographic data. Within the six areas of emphasis outlined above, a student may further focus interests in a variety of areas including: water resources, hydrogeology and environmental clean-up and monitoring, petroleum exploration and services, construction and urbanization involving geological applications, geophysics and geochemistry, sedimentary geology and paleontology, Quaternary geology and karst processes, Geographic Information Systems, human or physical geography, or analysis and prediction of weather and climate. A minimum of 40 credit hours in geoscience courses is required for the geoscience degree. A grade of C or higher is required on all departmental courses to satisfy graduation requirements. Students in the professional geology concentration are required to take the Association of State Board of Geologists Fundamentals of Geology (ASBOG-FG) exam. A minor in geoscience consists of a minimum of 14 credit hours in courses numbered 2000 and above, in addition to the first year courses. The following are examples of variations within a geoscience minor. A minor with a Geology emphasis should include physical (GG 1113/GG 1111) and historical geology (GG 1123/GG 1121) plus 14 hours 2000 and above for a total of 22 hours; for an Environmental Geoscience emphasis, physical and historical geology with laboratory plus introduction to environmental geology (GG 3133) and

emphasis, physical and historical geology with laboratory plus introduction to environmental geology (GG 3133) and other course work 2000 and above for a total of 22 hours; for emphasis in Geography, cultural geography (GR 2013), world geography (GR 1123) and other course work 2000 and above; and Broadcast Meteorology/climatology, physical geography (*GR 1114*) and either introduction to environmental geology (GG 3133) or conservation of natural resources (GR 3113) and other course work 2000 and above for a total of 21 hours. Minors in Geoscience are also available at the M.S. level.

Three educational enhancement awards and eight scholarships are available to students majoring in Geoscience, namely the F.F. Mellen, Forrest W. Pace, and Summer Geology Educational Enhancement awards, and the George W. Bishop, the Paul H. Dunn Memorial, the Ronald Greeley Memorial, the Gordon W. Gulmon, the Sistrunk Endowed, the Mark Worthey Endowed, the Alex Herbst Memorial, and the Dr. Charles Wax Endowed Scholarship. The three Educational Enhancement Awards provide financial assistance to those enrolled in field geology camp during the summer. The eight scholarships are awarded to students for academic excellence. All are restricted to students at junior or senior rank, with the exception of the Sistrunk Endowed, the Worthey Endowed, and the Greeley Memorial Scholarships. The Dr. Charles Wax Endowed Scholarship is only for graduate students.

The Department of Geosciences encourages involvement in Sigma Gamma Epsilon, a nationally recognized honorary Earth Science society and Gamma Theta Upsilon, international honor society in geography. Requirements for acceptance in Sigma Gamma Upsilon include a grade-point average of at least 3.00 in 12 or more hours of geoscience and a cumulative average of 2.67. Requirements for Gamma Theta Upsilon are a grade-point average of at least 3.3 overall as well as in at least 9 hours of "GR" courses.

The Department of Geosciences participates with the National Weather Association (NWA) and the American Meteorological Society (AMS) in training individuals for the respective “Weathercaster Seals of Approval”. The Office of the State Climatologist and the MSU Climatology Laboratory are housed in the Department and are strongly involved in programs for all students with interests in professional and broadcast meteorology and climatology.

Distance Learning Programs
The Department of Geosciences offers four distance learning programs listed below that can lead to a degree in Geosciences. Each program utilizes recorded lectures and

other course work 2000 and above for a total of 22 hours; for emphasis in Geography, cultural geography (GR 2013), world geography (GR 1123) and other course work 2000 and above; and Broadcast Meteorology/climatology, physical geography (**GR 1113/GR 1111**) and either introduction to environmental geology (GG 3133) or conservation of natural resources (GR 3113) and other course work 2000 and above for a total of 21 hours. Minors in Geoscience are also available at the M.S. level.

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Distance Learning Programs
The Department of Geosciences offers four distance learning programs listed below that can lead to a degree in Geosciences. Each program utilizes recorded lectures and the Internet for course instruction.

Broadcast and Operational Meteorology Program. A three-year, 17 course, 53 credit hour program of study that can lead to a B.S. degree in Geosciences. Primarily for individuals in television weather.

the Internet for course instruction. Broadcast and Operational Meteorology Program. A three-year, 17 course, 53 credit hour program of study that can lead to a B.S. degree in Geosciences. Primarily for individuals in television weather. *Teachers In Geoscience Program. A two-year, 12 course, 36 credit hour program of study that leads to a M.S. degree in Geosciences. Primarily for K-12 teachers. An additional two-year, 10 course, 30 credit hour program of advance course work is available.* Applied Meteorology Program. A two-year, 12 course 36 credit hour program of study that leads to a M.S. degree in Geosciences. Primarily for individuals with meteorological, environmental, or hazards-related careers. Environmental Geoscience Program. A 30-credit hour, non-thesis program that leads to a M.S. degree in Geosciences. It is designed for students interested in graduate study of a broad cross-section of the geosciences and is offered both on-campus and through distance education.	Applied Meteorology Program. A two-year, 12 course 36 credit hour program of study that leads to a M.S. degree in Geosciences. Primarily for individuals with meteorological, environmental, or hazards-related careers. Environmental Geoscience Program. A 30-credit hour, non-thesis program that leads to a M.S. degree in Geosciences. It is designed for students interested in graduate study of a broad cross-section of the geosciences and is offered both on-campus and through distance education.

CURRENT CURRICULUM OUTLINE	Required Hours	**PROPOSED CURRICULUM OUTLINE**	Required Hours
English Composition: EN 1103 English Composition I or *EN 1163 Accelerated Composition I* EN 1113 English Composition II or EN 1173 Accelerated Composition II	 3 3	English Composition: EN 1103 English Composition I or **EN 1104 Expanded English Composition I** EN 1113 English Composition II or EN 1173 Accelerated Composition II	 3 3
Foreign Language: *2 semesters - one Foreign Language (see advisor)*	*6*	Foreign Language: **Foreign Language I** **Foreign Language II**	 **3** **3**
Humanities: Literature – *see General Education courses* History – *see General Education courses*	 3 3	Humanities: Literature**– A&S core** History**– A&S core**	 3 3
Mathematics: *Specified under concentration areas*	*6*	Mathematics: **Specified in each concentration area**	
Fine Arts: *CO 1503 Introduction to the Theatre (for Broadcast Meteorology)* *See A&S Core requirements (for other concentrations)*	3	Fine Arts: **A&S core** **Note: CO 1503 required for Broadcast Meteorology concentration.**	3

Natural Sciences: *Specified under concentration areas*	 *9-12*	Natural Sciences: **Specified in each concentration area**	
Social Sciences: GR 1123 Introduction to World Geography *CO 1403 Introduction to the Mass Media (for Broadcast Meteorology)* *See Gen. Ed./A&S Core (other concentrations)*	 3 3 *3*	Social Sciences: GR 1123 Introduction to World Geography **A&S core** [1] **Note: CO 1403 required for Broadcast Meteorology concentration.**	 3 3
Major Core *Basic Courses* GG 1113 Survey of Earth Sciences I and GG 1111 Earth Sciences Laboratory I or *GR 1114 Elements of Physical Geography* Oral Communication *Requirement* CO 1003 Fundamentals of Public Speaking	 4 3	Major Core **Introductory Course with lab:** GG 1113 Survey of Earth Sciences I and GG 1111 Earth Sciences Laboratory I or **GR 1113 Physical Geography and** **GR 1111 Physical Geography Laboratory** Oral Communication**:** CO 1003 Fundamentals of Public Speaking **or** **CO 1013 Introduction to Communication**	 4 3
Choose one of the following concentrations:		Choose one of the following concentrations:	
Professional Geology Concentration (GEOL) The Professional Geology concentration is designed to prepare students for entry-level employment in the environmental consulting industry; state and federal government agencies; as well as energy and extraction industries, such as oil, gas, and coal. The Professional Geology degree also prepares students for application to a graduate program. Mathematics MA 1713 Calculus I MA 1723 Calculus II Natural Sciences CH 1213 Chemistry I CH 1211 Investigations in Chemistry I CH 1223 Chemistry II CH 1221 Investigations in Chemistry II PH 1113 General Physics I PH 1123 General Physics II PH 1133 General Physics III or GG 4233 Applied Geophysics or GG 4633 Introduction to Geochemistry Concentration Requirements GG 1121 Earth Sciences II Laboratory GG 1123 Survey of Earth Sciences II GG 3133 Introduction to Environmental Geology GG 3613 Water Resources *[1]* GG 4114 Mineralogy	 3 3 3 1 3 1 3 3 3 1 3 3 3 4	Professional Geology Concentration (GEOL) The Professional Geology concentration is designed to prepare students for entry-level employment in the environmental consulting industry; state and federal government agencies; as well as energy and extraction industries, such as oil, gas, and coal. The Professional Geology degree also prepares students for application to a graduate program. Mathematics MA 1713 Calculus I MA 1723 Calculus II Natural Sciences CH 1213 Chemistry I CH 1211 Investigations in Chemistry I CH 1223 Chemistry II CH 1221 Investigations in Chemistry II PH 1113 General Physics I PH 1123 General Physics II PH 1133 General Physics III or GG 4233 Applied Geophysics or GG 4633 Introduction to Geochemistry Concentration Requirements GG 1121 Earth Sciences II Laboratory GG 1123 Survey of Earth Sciences II GG 3133 Introduction to Environmental Geology GG 3613 Water Resources GG 4114 Mineralogy	 3 3 3 1 3 1 3 3 3 1 3 3 3 4

GG 4123	*3*	**GG 4124 Petrology**	**4**
GG 4201 Practicum on Paleontology	1	GG 4201 Practicum on Paleontology	1
GG 4304 Principles of Sedimentary Deposits I	4	GG 4304 Principles of Sedimentary Deposits I	4
GG 4413 Structural Geology	3	GG 4333 Geowriting [2]	3
GG 4333 Geowriting [2]	3	**GG 4414 Structural Geology**	4
GG 4443 Principles of Sedimentary Deposits II	3	GG 4443 Principles of Sedimentary Deposits II	3
GG 4503 Geomorphology	3	GG 4503 Geomorphology	3
GR 2313 Maps and Remote Sensing	*3*	GR 4303 Principles of GIS	3
GR 4303 Principles of GIS	3	GR 4633 Statistical Climatology	3
GR 4633 Statistical Climatology	3	or ST 2113 Introduction to Statistics	
or ST 2113 Introduction to Statistics		or ST 3123 Introduction to Statistical Inference	
or ST 3123 Introduction to Statistical Inference			
GG 4446 Summer Geology Field Camp	6	GG 4446 Summer Geology Field Camp [3]	6
Choose one of the following:	3		
GG 4413 Micropaleontology		Choose one of the following:	3
GG 4133 Principles of *Paleocology*		GG 4133 Principles of **Paleoecology**	
GG 4203 Principles of Paleobiology		GG 4203 Principles of Paleobiology	
		GG 4113 Micropaleontology	
Choose two of the following:	*6*		
GG 1113 Planetary Geology		**Choose one of the following:**	**3**
GG 3603 Introduction to Oceanography		GG 1113 Planetary Geology	
GG 4523 Coastal Environments		GG 3603 Introduction to Oceanography	
GR 1604 Weather and Climate		GG 4523 Coastal Environments	
		GR 1133 Weather and Climate	
Choose three additional courses from the following lists:		Choose three additional courses from the following lists:	**9**
Environmental Professional Emphasis		Environmental Professional Emphasis	
GG 4613 Physical Hydrogeology		**GG 4153 Engineering Geology**	
GG 4633 Introduction to Geochemistry		GG 4613 Physical Hydrogeology	
GG 4153 Engineering Geology		GG 4633 Introduction to Geochemistry	
Petroleum Professional Emphasis		Petroleum Professional Emphasis	
GG 4233 Applied Geophysics		**GG 4063 Earth and Atmospheric Energy Resources**	
GG 4433 Subsurface Methods		GG 4233 Applied Geophysics	
GG 4063 Earth and Atmospheric Energy Resources		GG 4433 Subsurface Methods	
Geospatial Professional Emphasis		Geospatial Professional Emphasis	
GR 4313 Advanced GIS		GR 4313 Advanced GIS	
GR 4333 Remote Sensing of the Physical Environment		GR 4333 Remote Sensing of the Physical Environment	
GR 4343 Advanced Remote Sensing in Geosciences		GR 4343 Advanced Remote Sensing in Geosciences	
GR 4363 Geographic Information Systems Programming		GR 4363 Geographic Information Systems Programming	
Total Hours	*124*	Total Hours	**120**

[1] *Fulfills Computer Literacy Requirement.*
[2] *Fulfills Computer Literacy Requirement and Writing Requirement.*
[3] *From an approved university. See advisor.*

Environmental Science Concentration (ENGS)	
The Environmental Geoscience concentration is designed to be a flexible degree that provides a broad cross-section of the geosciences with emphasis on environmental stewardship. The degree can be molded with the assistance of an academic adviser to suit individual goals of students that do not readily align with other geosciences curricula. The degree prepares students to work as a geoscientist or prepares students for graduate school in the geosciences or other related fields.	
Mathematics	
MA 1313 College Algebra	*3*
MA 1323 Trigonometry	3
Natural Sciences	
Science with lab (CH, PH, BIO)	6-8
Science without lab (CH, PH, BIO)	3
Concentration Requirements	
GG 3603 Introduction to Oceanography	3
GG 3613 Water Resources [1]	3
GG 4333 Geowriting [2]	3
GR 1604 Weather and Climate	*4*
GR 4633 Statistical Climatology [1]	3
or ST 2113 Introduction to Statistics	
or ST 3123 Introduction to Statistical Inference	
4000 level departmental courses	18
Choose one of the following:	3
GG 1113 Planetary Geology	
GG 3133 Introduction to Environmental Geology	
GG 4523 Coastal Environments	
GR 2313 Maps and Remote Sensing	
GR 3113 Conservation of Natural Resources	
GR 4813 Natural Hazards and Processes	
General Electives	36-
Consult advisor	38
Total Hours	124

[1] Fulfills Computer Literacy Requirement.
[2] Fulfills Computer Literacy Requirement and Writing Requirement.

Environmental Science Concentration (ENGS)	
The Environmental Geoscience concentration is designed to be a flexible degree that provides a broad cross-section of the geosciences with emphasis on environmental stewardship. The degree can be molded with the assistance of an academic adviser to suit individual goals of students that do not readily align with other geosciences curricula. The degree prepares students to work as a geoscientist or prepares students for graduate school in the geosciences or other related fields.	
Mathematics	
MA 1323 Trigonometry	3
Natural Sciences	
A&S core science with lab	6-8
A&S core science – lab not required	3
Concentration Requirements	
GG 3603 Introduction to Oceanography	3
GG 3133 Introduction to Environmental Geology or GR 3113 Conservation of Natural Resources	**3**
GG 3613 Water Resources	3
GG 4333 Geowriting [2]	3
GR 1133 Weather and Climate	**3**
GR 1131 Weather and Climate Laboratory	**1**
GR 4303 Principles of GIS	**3**
ST 2113 Introduction to Statistics	3
GG/GR 4000+ electives	18
Choose one of the following:	3
GG 1113 Planetary Geology	
GG 3133 Introduction to Environmental Geology or GR 3113 Conservation of Natural Resources (if not taken as a Concentration course)	
GG 4523 Coastal Environments	
GG 4543 Community Engagement in Geosciences	
GR 2313 Maps and Remote Sensing	
GR 4113 Political Ecology	
GR 4813 Natural Hazards and Processes	
General Electives	33-
Consult advisor	35
Total Hours	124

Geography Concentration (GPHY)		Geography Concentration (GPHY)	
This program prepares students to work in a variety of fields across the social and natural sciences. A geography degree can provide the multidisciplinary foundation necessary for careers in government, environmental management, education, planning, and development. People with geography degrees have found employment with: the US Census Bureau, National Parks Service, the National Forest Service, and other federal government agencies, non-profit organizations focusing on community and international development, the environmental assessment industry, the GIS/geospatial industry, environmental and historical interpretation, and urban and regional planning. Our students also receive a strong foundation for further graduate studies in geography and related disciplines.		This program prepares students to work in a variety of fields across the social and natural sciences. A geography degree can provide the multidisciplinary foundation necessary for careers in government, environmental management, education, planning, and development. People with geography degrees have found employment with: the US Census Bureau, National Parks Service, the National Forest Service, and other federal government agencies, non-profit organizations focusing on community and international development, the environmental assessment industry, the GIS/geospatial industry, environmental and historical interpretation, and urban and regional planning. Our students also receive a strong foundation for further graduate studies in geography and related disciplines.	
Mathematics		Mathematics	
MA 1313 College Algebra	*3*	MA 1323 Trigonometry	3
MA 1323 Trigonometry	3		
		Natural Sciences	
Natural Sciences		**A&S core science with lab**	**6-8**
Science with lab (CH, PH, BIO)	*6-9*	**A&S core science – lab not required**	3
Science without lab (CH, PH, BIO)	3		
		Concentration Requirements	
Concentration Requirements		GG 4333 Geowriting [2]	3
GG 4333 Geowriting [1]	3	**GR 1133 Weather and Climate**	**3**
GR 1604 Weather and Climate	4	**GR 1131 Weather and Climate Laboratory**	**1**
GR 2013 Human Geography	3	GR 2013 Human Geography	3
GR 2313 Maps and Remote Sensing	3	GR 2313 Maps and Remote Sensing	3
GR 4203 Geography of North America	3	GR 4203 Geography of North America	3
GR 4303 Principles of GIS	3	GR 4303 Principles of GIS	3
GR 4633 Statistical Climatology	3	ST 2113 Introduction to Statistics	3
or ST 2113 Introduction to Statistics			
or ST 3123 Introduction to Statistical Inference		**GG/GR 4000+ electives**	15
4000 level departmental courses	12	Choose four of the following:	12
		GG 3133 Introduction to Environmental Geology	
Choose four of the following:	12	GG 3603 Introduction to Oceanography	
GG 3133 Introduction to Environmental Geology		GG 3613 Water Resources	
GG 3603 Introduction to Oceanography		GG 4523 Coastal Environments	
GG 3613 Water Resources [2]		GR 3113 Conservation of Natural Resources	
GG 4523 Coastal Environments		**GR 4113 Political Ecology**	
GR 3113 Conservation of Natural Resources		GR 4813 Natural Hazards and Processes	
GR 4813 Natural Hazards and Processes			
Choose four of the following:	12	Choose four of the following:	12
GR 4123 Urban Geography		GR 4123 Urban Geography	
GR 4213 Geography of Latin America		GR 4213 Geography of Latin America	
GR 4223 Geography of Europe		GR 4223 Geography of Europe	
GR 4233 Geography of Asia		GR 4233 Geography of Asia	
GR 4243 Geography of Russia and the Former Soviet Republics		GR 4243 Geography of Russia and the Former Soviet Republics	

GR 4253 Geography of Africa GR 4263 Geography of the South GR 4283 Geography of the Islamic World		GR 4253 Geography of Africa GR 4263 Geography of the South GR 4283 Geography of the Islamic World	
General Electives Consult Advisor	*14-17*	General Electives Consult Advisor	**15-17**
Total Hours	124	Total Hours	124
[1] Fulfills Computer Literacy Requirement and Writing Requirement. *[2] Fulfills Computer Literacy Requirement.*			
Broadcast Meteorology (BMP)		Broadcast Meteorology (BMP)	
This program focuses on preparing students for a career in radio/television weathercasting. The coursework does not meet the requirements for the American Meteorological Society's Certified Broadcast Meteorological Seal of Approval because it lacks some of the math and physics requirements. Individuals can, however, be qualified to earn the National Weather Association Seal of Approval after working in the industry for three years.		This program focuses on preparing students for a career in radio/television weathercasting. The coursework does not meet the requirements for the American Meteorological Society's Certified Broadcast Meteorological Seal of Approval because it lacks some of the math and physics requirements. Individuals can, however, be qualified to earn the National Weather Association Seal of Approval after working in the industry for three years.	
Mathematics		Mathematics	
MA 1713 Calculus I	3	MA 1713 Calculus I	3
MA 1723 Calculus II	3	MA 1723 Calculus II	3
Natural Sciences		Natural Sciences	
CH 1043 Survey of Chemistry I	3	CH 1043 Survey of Chemistry I	3
PH 1113 General Physics I (w/ lab)	3	PH 1113 General Physics I (w/ lab)	3
PH 1123 General Physics II (w/ lab)	3	PH 1123 General Physics II (w/ lab)	3
Concentration Requirements		Concentration Requirements	
GR 1604 Weather and Climate	4	**GR 1133 Weather and Climate**	**3**
GR 4422		**GR 1131 Weather and Climate Laboratory**	**1**
GR 4432		**GR 3011 Weather Analysis**	**1**
GR 4623 Physical Meteorology	*3*	**GR 4423 Weather Forecasting I**	**3**
GR 4633 Statistical Climatology [1]	3	**GR 4433 Weather Forecasting II**	**3**
or ST 3123 Introduction to Statistical Inference		GR 4623 Physical Meteorology	3
GR 4643 Physical Meteorology and Climatology I	3	GR 4633 Statistical Climatology	3
GR 4733 Synoptic Meteorology	3	or ST 3123 Introduction to Statistical Inference	
GR 4783 Satellite Meteorology	3	GR 4643 Physical Meteorology and Climatology I	3
or GR 4883 Radar Meteorology		**GR 4693 Physical Meteorology and Climatology II**	**3**
GR 4823 Dynamic Meteorology I	3	GR 4733 Synoptic Meteorology	3
GR 4963 Mesoscale Meteorology	3	GR 4783 Satellite Meteorology	3
GR 4502 Practicum in Broadcast Meteorology I	2	or GR 4883 Radar Meteorology	
GR 4512 Practicum in Broadcast Meteorology II	2	GR 4823 Dynamic Meteorology I	3
GR 4522 Practicum in Broadcast Meteorology III	2	GR 4963 Mesoscale Meteorology	3
GR 4532 Practicum in Broadcast Meteorology IV	2	GR 4502 Practicum in Broadcast Meteorology I	2
CO 2013 Voice and Articulation	*3*	GR 4512 Practicum in Broadcast Meteorology II	2
CO 3313 News Writing for the Electronic Media [2]	3	GR 4522 Practicum in Broadcast Meteorology III	2
CO 2333 Television Production	3	GR 4532 Practicum in Broadcast Meteorology IV	2
CO 3333 Advanced Television Production	3		

		CO 2413 Intro to News Writing	**3**
Choose four of the following:	*12*	CO 3313 News Writing for the Electronic Media [2]	3
GG 3603 Introduction to Oceanography		CO 2333 Television Production	3
GG 3613 Water Resources		CO 3333 Advanced Television Production	3
GG 4523 Coastal Environments			
GR 3113 Conservation of Natural Resources			**9**
GR 4303 Principles of GIS		**Choose three of the following:**	
GR 4203 Geography of North America		GG 3603 Introduction to Oceanography	
GR 4553 Computer Methods in Meteorology		GG 3613 Water Resources	
GR 4613 Applied Climatology		GG 4523 Coastal Environments	
GR 4813 Natural Hazards and Processes		GR 3113 Conservation of Natural Resources	
GR 4883 Radar Meteorology (if not taken as a Concentration course)		**GR 4203 Geography of North America**	
or GR 4783 Satellite Meteorology		GR 4303 Principles of GIS	
GR 4943 Tropical Meteorology		GR 4553 Computer Methods in Meteorology	
GR 4933 Dynamic Meteorology II		**GR 4563 Aviation Meteorology**	
		GR 4613 Applied Climatology	
		GR 4813 Natural Hazards and Processes	
General Electives	*14*	**GR 4783 Satellite Meteorology**	
Consult advisor		**or GR 4883 Radar Meteorology (if not taken as a Concentration course)**	
Total Hours	124	GR 4933 Dynamic Meteorology II	
		GR 4943 Tropical Meteorology	
[1] Fulfills Computer Literacy Requirement.			
[2] Fulfills Writing Requirement.		General Electives	**11**
		Consult advisor	
		Total Hours	124
Professional Meteorology (PMET)		Professional Meteorology (PMET)	
This program focuses on the study of atmospheric processes and climatic variability. Upon completion of the program (operational emphasis), students will have met the coursework requirements for the National Weather Service, the private meteorology sector, or continue their education in graduate school. Students choosing the program with the broadcast emphasis can also work for the National Weather Service and also earn the American Meteorological Society's Certified Broadcast Meteorologist Seal of Approval.		This program focuses on the study of atmospheric processes and climatic variability. Upon completion of the program (operational emphasis), students will have met the coursework requirements for the National Weather Service, the private meteorology sector, or continue their education in graduate school. Students choosing the program with the broadcast emphasis can also work for the National Weather Service and also earn the American Meteorological Society's Certified Broadcast Meteorologist Seal of Approval.	
Mathematics		Mathematics	
MA 1713 Calculus I	3	MA 1713 Calculus I	3
MA 1723 Calculus II	3	MA 1723 Calculus II	3
MA 2733 Calculus III	3	MA 2733 Calculus III	3
MA 3253 Differential Equations I	3	**MA 2743 Calculus IV**	**3**
		MA 3253 Differential Equations I	3
Natural Sciences			
CH 1213 Chemistry I	3	Natural Sciences	
CH 1211 Investigations in Chemistry I	1	CH 1213 Chemistry I	3
PH 2213 Physics I	3	CH 1211 Investigations in Chemistry I	1
PH 2223 Physics II	3	PH 2213 Physics I	3
		PH 2223 Physics II	3

Concentration Requirements	
GG 4333 Geowriting [2, 3]	3
or CO 3313 News Writing for the Electronic Media	
GR 1604 Weather and Climate	*4*
GR 4422	
GR 4432	
GR 4623 Physical Meteorology	3
GR 4633 Statistical Climatology [1]	3
or ST 3123 Introduction to Statistical Inference	
GR 4643 Physical Meteorology and Climatology I	3
GR 4733 Synoptic Meteorology	3
GR 4783 Satellite Meteorology	3
or GR 4883 Radar Meteorology	
GR 4823 Dynamic Meteorology I	3
GR 4933 Dynamic Meteorology II	3
GR 4963 Mesoscale Meteorology	3
Choose four of the following:	*12*
GG 3603 Introduction to Oceanography	
GG 3613 Water Resources	
GR 4363 Geographic Information Systems Programming [1]	
GG 4523 Coastal Environments	
GR 4813 Natural Hazards and Processes	
GR 3113 Conservation of Natural Resources	
GR 4203 Geography of North America	
GR 4303 Principles of GIS	
GR 4553 Computer Methods in Meteorology	
GR 4613 Applied Climatology	
GR 4883 Radar Meteorology (if not taken as a Concentration course)	
or GR 4783 Satellite Meteorology	
GR 4943 Tropical Meteorology	
Specified Electives	*20-*
See advisor	*21*
AMS (Broadcast Meteorology)	
GR 4502 Practicum in Broadcast Meteorology I	*2*
GR 4512 Practicum in Broadcast Meteorology II	*2*
GR 4522 Practicum in Broadcast Meteorology III	*2*
GR 4532 Practicum in Broadcast Meteorology IV	*2*
CO 2013 Voice and Articulation	*3*
CO 2333 Television Production	*3*
CO 3333 Advanced Television Production	*3*
GIS	
GR 2313 Maps and Remote Sensing	*3*
GR 3303 Survey of Geospatial Technologies	*3*
GR 4303 Principles of GIS	*3*
GR 4313 Advanced GIS	*3*
GR 4323 Cartographic Sciences	*3*
GR 4333 Remote Sensing of the Physical Environment	*3*
GR 4353 Geodatabase Design	*3*

Concentration Requirements	
GG 4333 Geowriting [2, 4]	3
or CO 3313 News Writing for the Electronic Media	
GR 1133 Weather and Climate	**3**
GR 1131 Weather and Climate Laboratory	**1**
GR 3011 Weather Analysis	**1**
GR 4423 Weather Forecasting I	**3**
GR 4433 Weather Forecasting II	**3**
GR 4633 Statistical Climatology	3
or ST 3123 Introduction to Statistical Inference	
GR 4643 Physical Meteorology and Climatology I	3
GR 4693 Physical Meteorology and Climatology II	**3**
GR 4733 Synoptic Meteorology	3
GR 4783 Satellite Meteorology	3
or GR 4883 Radar Meteorology	
GR 4823 Dynamic Meteorology I	3
GR 4933 Dynamic Meteorology II	3
GR 4963 Mesoscale Meteorology	3
Choose three of the following:	**9**
GG 3603 Introduction to Oceanography	
GG 3613 Water Resources	
GR 4363 Geographic Information Systems Programming [2]	
GG 4523 Coastal Environments	
GR 3113 Conservation of Natural Resources	
GR 4203 Geography of North America	
GR 4303 Principles of GIS	
GR 4553 Computer Methods in Meteorology	
GR 4563 Aviation Meteorology	
GR 4613 Applied Climatology	
GR 4813 Natural Hazards and Processes	
GR 4783 Satellite Meteorology	
or GR 4883 Radar Meteorology (if not taken as a Concentration course)	
GR 4943 Tropical Meteorology	
Specified Electives	
Consult advisor	**18**
Total Hours	124

ROTC			
AS 1012	*2*		
AS 1022	*2*		
AS 2012	*2*		
AS 2022	*2*		
AS 3013 Leading People and Effective Communication-I	*3*		
AS 3023 Leading People and Effective Communication-II	3		
AS 4013 National Security and Commissioning Preparations-I	3		
AS 4023 National Security and Commissioning Preparations-II	3		
General Electives	*0-1*		
Consult advisor			
Total Hours	124		
[1] Fulfills Computer Literacy Requirement.			
[2] Fulfills Writing Requirement.			
[3] CO 3313 must be taken for the Broadcast Meteorology emphasis			
Geographic Information Systems (GIS)		Geographic Information Systems (GIS)	
This program provides a fundamental background in the geospatial sciences, including geographic information systems, remote sensing, spatial analysis, database management, geospatial modeling, and spatial programming. The geospatial sciences are applicable to many different fields and will prepare students for careers in: government agencies, urban and regional planning, environmental management, intelligence, natural areas management, local government, transportation planning and many others. This program also prepares students for further graduate studies in geospatial disciplines.		This program provides a fundamental background in the geospatial sciences, including geographic information systems, remote sensing, spatial analysis, database management, geospatial modeling, and spatial programming. The geospatial sciences are applicable to many different fields and will prepare students for careers in: government agencies, urban and regional planning, environmental management, intelligence, natural areas management, local government, transportation planning and many others. This program also prepares students for further graduate studies in geospatial disciplines.	
Mathematics		Mathematics	
MA 1313 College Algebra	*3*	MA 1323 Trigonometry	3
MA 1323 Trigonometry	3		
		Natural Sciences	
Natural Sciences		**A&S core science with lab**	**6-8**
Science with lab (CH, PH, BIO)	*6-9*	**A&S core science – lab not required**	3
Science without lab (CH, PH, BIO)	3		
		Concentration Requirements	
Concentration Requirements		**GR 1133 Weather and Climate**	**3**
GR 1604 Weather and Climate	*4*	**GR 1131 Weather and Climate Laboratory**	**1**
GR 2313 Maps and Remote Sensing	3	GR 2313 Maps and Remote Sensing	3
GR 3303 Survey of Geospatial Technologies	3	GR 3303 Survey of Geospatial Technologies	3
GR 3113 Conservation of Natural Resources	3	GR 3113 Conservation of Natural Resources	3

GR 4303 Principles of GIS	3	GR 4303 Principles of GIS	3
GR 4313 Advanced GIS	3	GR 4313 Advanced GIS	3
GR 4323 Cartographic Sciences	3	GR 4323 Cartographic Sciences	3
GR 4333 Remote Sensing of the Physical Environment	3	GR 4333 Remote Sensing of the Physical Environment	3
GR 4353 Geodatabase Design	3	**GR 4343 Advanced Remote Sensing in Geosciences**	**3**
GG 4333 Geowriting [2]	3	GR 4353 Geodatabase Design	3
4000 level departmental courses	*12*	**GR 4363 Geographic Information Systems Programming**	**3**
CSE 1284 Introduction to Computer Programming	4	**GR 4373 Web GIS**	**3**
ST 3123 Introduction to Statistical Inference or GR 4633 Statistical Climatology	3	**GR 4411 Remote Sensing Seminar**	**1**
GR 4343 Advanced Remote Sensing in Geosciences	3	GG 4333 Geowriting [2]	3
GR 4363 Geographic Information Systems Programming	3	CSE 1284 Introduction to Computer Programming	4
PSS 4411 Remote Sensing Seminar	1	ST 3123 Introduction to Statistical Inference or GR 4633 Statistical Climatology	3
Choose two of the following:	6	Choose two of the following:	6
GG 3133 Introduction to Environmental Geology		GG 3133 Introduction to Environmental Geology	
GG 3603 Introduction to Oceanography		GG 3603 Introduction to Oceanography	
GG 3613 Water Resources [1]		GG 3613 Water Resources	
GG 4523 Coastal Environments		GG 4523 Coastal Environments	
GR 4813 Natural Hazards and Processes		GR 4813 Natural Hazards and Processes	
General Electives Consult advisor	*9-12*	**GR/GG 4000+ Electives**	**12**
		General Electives Consult advisor	**10-12**
Total Hours	124	Total Hours	124
[1] Fulfills Computer Literacy Requirement. *[2] Fulfills Computer Literacy Requirement and Writing Requirement.*			
Broadcast Meteorology (Distance Learning only)		Broadcast Meteorology (Distance Learning only)	
Mathematics		Mathematics	
See A&S Core requirements		**Math– A&S core**	**3**
Natural Sciences		Natural Sciences	
See A&S Core requirements		**A&S core science with lab**	**6-8**
		A&S core science – lab not required	**3**
		Concentration Requirements	
		GR 1133 Weather and Climate	**3**
Concentration Requirements		**GR 1131 Weather and Climate Laboratory**	**1**
GR 1604 Weather and Climate	*4*	GR 4443 Weather Prediction I	3
GR 4443 Weather Prediction I	3	GR 4453 Weather Prediction II	3
GR 4453 Weather Prediction II	3	GR 4473 Numerical Weather Prediction	3
GR 4473 Numerical Weather Prediction	3	GR 4613 Applied Climatology	3
GR 4613 Applied Climatology	3	GR 4623 Physical Meteorology	3
GR 4623 Physical Meteorology	3	GR 4633 Statistical Climatology	3
GR 4633 Statistical Climatology	3	GR 4643 Physical Meteorology and Climatology I	3
GR 4643 Physical Meteorology and Climatology I	3	GR 4713 Synoptic Meteorology I or GR 4733 Synoptic Meteorology	3
GR 4713 Synoptic Meteorology I or GR 4733 Synoptic Meteorology	3	GR 4753 Satellite and Radar Meteorology	3
GR 4753 Satellite and Radar Meteorology	3	GR 4813 Natural Hazards and Processes	3
GR 4813 Natural Hazards and Processes	3	GR 4913 Thermodynamic Meteorology	3

GR 4913 Thermodynamic Meteorology or GR 4823 Dynamic Meteorology I GR 4923 Severe Weather or GR 4963 Mesoscale Meteorology GG 3603 Introduction to Oceanography GG 3613 Water Resources GG 4333 Geowriting [2] or CO 3313 News Writing for the Electronic Media General Electives Total Hours *[1] Fulfills Computer Literacy Requirement.* *[2] Fulfills Computer Literacy Requirement and Writing Requirement.*	3 3 3 3 3 24-26 124	or GR 4823 Dynamic Meteorology I GR 4923 Severe Weather or GR 4963 Mesoscale Meteorology GG 3603 Introduction to Oceanography GG 3613 Water Resources GG 4333 Geowriting [2] or CO 3313 News Writing for the Electronic Media General Electives Total Hours	 3 3 3 3 **27-29** 124
		Note: Students must complete 31 upper division hours in A&S in residence at MSU. **[1] Social Science courses must cover two disciplines and come from A&S core.** **[2] Satisfies Jr/Sr Writing requirement** **[3] From an approved university. Consult advisor.** **[4] CO 3313 must be taken for the Broadcast Meteorology concentration.**	

3. Justification and Student Learning Outcomes

The modifications to the concentrations within the Department of Geoscience primarily focused on addressing systematic issues within the curriculum that have needed to be resolved since previous revisions. These revisions included using an appropriate number of course credit hours based on course contact for several courses within geology, the addition of two required courses within the professional meteorology curriculum (comprising 4 hours), and the introduction of a few elective courses throughout all disciplines.

An additional change that was made was the splitting of GR 1114 Physical Geography and GR 1604 Weather and Climate into two separate courses, a lecture course and a lab course. For Physical Geography, this was GR 1113 and GR 1111 for the lecture and lab, respectively, while for GR 1604, the new courses are GR 1133 and GR 1131. There are several advantages to this change. It allows for the teaching of supersections of GR 1113 and GR 1133 which can aid in service to the university. Additionally, it allows students who are transferring into MSU and have taken the lecture but not the lab courses the opportunity to only take the lab portion. As other schools do not have such a setup, this could aid in bringing additional majors to Geosciences. Finally, this model is consistent with other science fields in the College (such as Earth Science and Chemistry).

In addition to these changes, the College of Arts & Sciences is spearheading a movement to bring different degree tracks under their header to have similar verbiage and description. The proposed changes to the general education and college requirements are being made for two primary reasons: (1) to bring the official catalog listing in line with the way the program has been functioning for years and (2) to provide greater clarity and accuracy. Students in the College of Arts & Sciences must adhere to the A&S core when fulfilling general education requirements. Though this is stated in the college section of the catalog, the clarification was never made within the program's listing. The proposed changes are seeking to correct this to ensure that the catalog listing, CAPP/DegreeWorks, and current practices all align and make all expectations and rules as clear as possible.

We break down the justification for department-level curriculum changes in the text below.

3a. Professional Geology

Justification

The primary modifications to the Professional Geology concentration were encompassed by the addition of a course credit hour for GG 4124 Petrology and GG 4414 Structural Geology. The course was already being taught as a 3 hour lecture 2 hour lab, and after a recent course modification it is now reflected that way in the new curriculum. Additionally, the GR 1133 Weather and Climate, which was formally GR 1604 Weather and Climate and included a lab, was updated so that students will be required to get the lecture material but not the lab material, which is more appropriate for those interested in geology for a career.

In addition to these changes, the number of elective hours was reduced by 6 to accommodate the increase of 2 hours for the aforementioned courses and to bring the total course hour requirements to 120 hours. The geology group in the department felt that this was adequate to obtain the necessary professional geology expertise, though students will likely still exceed this count of total course hours.

Student Learning Outcomes and Assessment

The goal of this curriculum is to prepare students for a career as a professional geologist, including preparation of students for graduate studies in geology. Upon completion of this degree program, students will be able to:

- Receive a passing score on the ASBOG examination
- Work as a professional geologist
- Read and interpret literature related to geologic processes
- Readily identify rocks, minerals, and their associated chemical compositions, as well as the implications of these on the local geology
- Work in the oil and gas industry
- Serve as environmental consultants
- Be prepared for graduate study in geology

The assessment of these learning outcomes will be completed by student performance in the ASBOG, National Association of State Boards of Geologists exam.

3b. Environmental Geoscience

Justification

Students on the Environmental Geoscience concentration receive a well-rounded education in a variety of Geoscience sub-fields, which prepare them for job placement in specific careers related to environmental issues. In addition to the minor modification of Weather and Climate from a 4 hour course to a 3 hour lecture 1 hour lab course, the only modification to this concentration was the inclusion of GR 4113 Political Ecology as possible geoscience elective. This course addresses relevant policy and equity issues within the realm of environmental geoscience, and with recent changes to the workforce, such content is valuable for those seeking careers in these fields.

Student Learning Outcomes and Assessment

There is no change to the current student learning outcomes and assessment.

3c. Geography

Justification

Much like Environmental Geosciences, other than adding GR 4113 Political Ecology as a possible elective to select from and modifying GR 1604 into GR 1133 and GR 1131, no major changes were made to the Geography curriculum. However, as stated above, the inclusion of GR 4113 will allow students exposure to relevant social and equity issues within the field of human geography, which is a valuable perspective in the modern era, which is what motivated the update to the curriculum.

Student Learning Outcomes and Assessment

There is no change to the current student learning outcomes and assessment.

3d. Broadcast Meteorology

Justification

In modifying GR 1604 into two separate courses (GR 1133 and GR 1131), this will help facilitate transfer majors into meteorology who may have taken Weather and Climate as a lecture course without the lab. Currently this issue arises each year with transfers and results in students having to retake the lecture course to get the lab material, which is foundational for much of what else is taught in the meteorology curriculum.

We also modified the forecasting sequence of courses for this degree track, increasing the number of hours from 2 to 3 for each Forecasting course (of which there are two). The broadcast meteorology curriculum is an application-focused concentration, and as such, we agree it is important to provide additional content in our forecasting sequence by adding a lab course. We are adding a lab course to each of the forecasting courses (GR 4423 and GR 4433). Importantly, we also added a new course, GR 3011 Weather Analysis, which is intended to bridge the gap between GR 1133 Weather and Climate and GR 4733 Synoptic meteorology. Students often cite this gap as their biggest challenge in the meteorology curriculum, and meteorology curricula around the nation often cite this gap as the biggest challenge when educating meteorology majors. GR 3011 was taught last year and was highly successful in bridging that gap, which is why we decided to require it for all majors in both broadcast and professional meteorology.

Finally, since our broadcast meteorology students are required to do CO 3313 Electronic News Writing as their upper-division writing course, we added CO 2413, which is a prerequisite for CO 3313.

In total, these changes resulted in modifying 6 total course hours, which is well below the 15% of 124 hours within the degree track.

Student Learning Outcomes and Assessment

Students on the broadcast meteorology track should be qualified to work as a broadcast meteorologist either online, in television, or on radio (or any other media platform). Upon completion of the degree program, students will be able to:

- Work as a broadcast meteorologist
- Conduct general news reporting and news writing
- Work with various media platforms in communicating meteorology
- Serve as a science expert in primarily non-scientific communities (such as in media)
- Understand and interpret weather data in both space and time
- Develop a successful forecast for any given location in the United States
- Read and understand meteorological literature
- Present a weather story on air and provide real-time weather coverage for major weather events

We will assess these outcomes by surveying students that have completed the track and looking at their performance in their fields. Currently, the department has a high success rate of job placement for broadcast meteorologists (approaching 90%), and we will continue to update and ideally increase that number in future years.

3e. Professional Meteorology

Justification

In modifying GR 1604 into two separate courses (GR 1133 and GR 1131), this will help facilitate transfer majors into meteorology who may have taken Weather and Climate as a lecture course without the lab. Currently this issue arises each year with transfers and results in students having to retake the lecture course to get the lab material, which is foundational for much of what else is taught in the meteorology curriculum.

We also modified the forecasting sequence of courses for this degree track, increasing the number of hours from 2 to 3 for each Forecasting course (of which there are two). The broadcast meteorology curriculum is an application-focused concentration, and as such, we agree it is important to provide additional content in our forecasting sequence by adding a lab course. We are adding a lab course to each of the forecasting courses (GR 4423 and GR 4433). Importantly, we also added a new course, GR 3011 Weather Analysis, which is intended to bridge the gap between GR 1133 Weather and Climate and GR 4733 Synoptic meteorology. Students often cite this gap as their biggest challenge in the meteorology curriculum, and meteorology curricula around the nation often cite this gap as the biggest challenge when educating meteorology majors. GR 3011 was taught last year and was highly successful in bridging that gap, which is why we decided to require it for all majors in both broadcast and professional meteorology.

We also added another possible elective course in GR 4563 Aviation Meteorology. This course taps into the unique expertise of our faculty who have experience in aviation, and this expertise will provide students a new skill set working with forecasting within the field of aviation, which most universities do not currently have available.
Finally, we modified the course setup by creating a sequence of GR 4643 and GR 4693 from original courses of GR 4643 and GR 4623. No course content was changed, but this sequence helps clarify

advising and prerequisite content between the two courses.

Finally, we have added a requirement for MA 2743 Calculus IV. This course has always been a prerequisite for MA 3253 Differential Equations, but our meteorology students have typically not taken it for different reasons. However, the course content within that course, namely the vector Calculus content, is highly relevant to Dynamic meteorology courses, and as such we agreed that it was useful to begin requiring this course of our professional meteorology majors. Other professional meteorology curricula around the nation also require Calculus IV prior to differential equations, so this change helps to align our curriculum with other meteorology programs around the nation.

Student Learning Outcomes and Assessment

Students on the professional meteorology track will be qualified for careers as a meteorologist and for graduate study in the field of meteorology. Upon completion of the degree, students will be able to:

- Understand and interpret weather data in both space and time
- Develop a successful forecast for any given location in the United States
- Read and understand meteorological literature
- Have civil service requirements (e.g., NOAA's National Weather Service) and be qualified to work for most operational meteorology positions
- Have unique expertise in different areas of meteorology, tailored to the student's interests and career goals
- Have the math and science background expected of a meteorology graduate based on programs around the nation
- Have extensive operational forecasting and analysis experience that many programs do not offer

We will assess these outcomes by surveying students that have completed the track and looking at their performance in their fields. Additionally, we will track the rate at which students are enrolling in our unique courses (such as aviation and forecasting) as a measure of success in accomplishing points 2 and 4 above.

3f. Geospatial Science

Justification

Changes that are made to the Geospatial Science (GIS) degree were primarily superficial in nature, as we modified GR 1604 to GR 1133 and GR 1131 (as with other concentrations). We also modified the cross-listing of PSS 4411 to GR 4411, since the course is taken in Geosciences. We did add one new required course to the GIS concentration, GR 4373 Web GIS. Given the advent of web-based GIS platforms, having knowledge of these platforms is of critical importance for graduates. Given the wide availability of GIS careers, adding GR 4373 fills an important hole our current curriculum had and makes our students more competitive for those positions.

Student Learning Outcomes and Assessment

Upon completion of the GIS program, students will be able to:

- Operate a geospatial program to answer questions relevant to a given end user
- Read and interpret remotely sensed data and link those data back to mapped portrayals of Earth's surface
- Develop software that can work through large geospatial datasets
- Have a detailed knowledge of remote sensing platforms used to map Earth's surface

- Have strong programming backgrounds and capabilities to solve complex geographic problems using map software
- Have current knowledge of the most up to date technologies in the field of Geospatial Science

To measure success of these outcomes, the department will reevaluate the technological platforms taught in the coursework every 2-3 years, and will integrate updated research tasks in the classroom. Additionally, we will survey graduates to ensure they are getting jobs utilizing the technology taught in our coursework and will engage stakeholders to ensure our work is in line with what employers are looking for.

3d. Broadcast and Operational Meteorology

Justification

Only GR 1604 was modified into GR 1133 and GR 1131 for this program. No other major changes were made to this online program.

Student Learning Outcomes and Assessment

There is no change to the current student learning outcomes and assessment.

3g. Programmatic Review Assessment

The proposed changes do not comprise 15% of the total curriculum, as the largest changes were seen in the Professional Geology and Professional Meteorology curricula and only comprised 6 credit hours (roughly 5%) out of 120/124. As such, no programmatic review was needed for this modification.

3h. Required Questions

- *Will this program change meet local, state, regional, and national educational and cultural needs? If so, please describe.*

We expect these changes, while minor, to have an impact on improving student retention, graduation rate, and will increase the educational experience of the students. Further, the addition of some more specified electives will enhance both educational and cultural aspects of our program.

- *Will this program change result in duplication in the System? If so, please describe.*

There will be no duplication from this program change. We are primarily modifying content, not adding content.

- *Will this program change/advance student diversity within the discipline? If so, please describe.*

The changes will likely not dramatically alter diversity within the discipline as they are primarily science content in nature. However, the additional courses will certainly open up more career opportunities for our students, which are already quite diverse compared to geoscience students around the nation, and the additional employment opportunities will likely lead to increased diversity in geoscience fields. Further, the addition of GR 4113 Political Ecology will provide an avenue for underrepresented groups to be included in a Geosciences course, which is likely to enhance student diversity within the discipline of human geography.

- *Will this program change result in an increase in the potential placement of graduates in MS, the Southeast, and in the U.S.? If so, please describe.*

The introduction of focus areas in both the meteorology and geology curricula will be very U.S. focused (particularly in meteorology), allowing students to work with new technologies and advancements by U.S. scientists. It is only logical to expect that those results will translate into additional placement of students within the U.S., many of whom will be placed within the Southeast where oil and gas resources are plentiful and where hazards from atmospheric processes are abundant.

- *Will this program change result in an increase in the potential salaries of graduates in MS, the Southeast, and the U.S.? If so, please describe.*

As these changes are primarily superficial, we do not anticipate a dramatic shift in potential salaries for graduates. However, more specified expertise in aviation could open new opportunities for students.

4. Support

A letter of support from the Department of Geosciences Curriculum Committee is attached to this proposal. A letter supporting the addition of MA 2743 Calculus IV is included as well.

5. Proposed 4-letter abbreviations (will remain unchanged):

Professional Geology: GEOL
Environmental Geoscience: ENGS
Geography: GPHY
Broadcast Meteorology: BMP
Professional Meteorology: PMET
Geographic Information Systems: GIS
Broadcast and Operational Meteorology BOPM

6. Effective Date

Fall 2023

7. CIP Number

40.0601

MISSISSIPPI STATE UNIVERSITY

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September 6, 2022

College of Arts and Sciences and the University Courses and Curriculum Committees

Mississippi State University

RE: Modification of Undergraduate Curriculum for the Department of Geosciences

Dear Curriculum Committee,

The Department of Geosciences curriculum committee has met and discussed the numerous minor changes/edits to our curriculum that are included in the attached proposal. We fully support the implementation of these changes and feel they will do a lot to improve the clarity of our curriculum as well as support its modernization with the new courses being added. If you have any questions or concerns about the proposed changes, please do not hesitate to contact us.

Respectfully,

Andrew Mercer Digitally signed by Andrew Mercer Date: 2022.09.06 12:04:35 -05'00'

Andrew Mercer (Committee Chair)

Padmanava Dash Digitally signed by Padmanava Dash Date: 2022.09.06 23:54:09 -05'00'

Padmanava Dash (Committee Member)

Christa R. Haney Digitally signed by Christa R. Haney Date: 2022.09.06 14:31:37 -05'00'

Christa Haney (Committee Member)

Sarah Lalk Digitally signed by Sarah Lalk DN: cn=Sarah Lalk, o, ou, email=spr67@msstate.edu, c=US Date: 2022.09.06 15:43:27 -05'00'

Sarah Lalk (Committee Member)

Brian S. Williams Digitally signed by Brian S. Williams Date: 2022.09.07 09:20:14 -05'00'

Brian Williams (Committee Member)

Cc: Dr. John C. Rodgers, Department Head of Geosciences

MISSISSIPPI STATE UNIVERSITY

College of Arts and Sciences
Department of Mathematics and Statistics

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www.math.msstate.edu

To Whom it may concern,

The Department of Geosciences wishes to change the prerequisites for their professional meteorology concentration, in particular they request to add MA 2743. The Courses and Curriculum Committee at the department level, the entity writing this letter, is in full support of adopting these changes and updates, as this will only help students and better the learning environment for them. Please accept this letter of support.

Sincerely,

Matthew S. McBride

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