Program Approval Form

For approval of new programs and deletions or modifications to an existing program.

Action Requested:

- [ ] Create New (SCHEV approval required except for minors)
- [ ] Inactivate Existing
- [x] Modify Existing (check **ALL** that apply)
  - [ ] Title (SCHEV approval required except for minors)
  - [ ] **Concentration** (Choose one): [ ] *Add* [ ] *Delete* [ ] *Modify*
  - [x] Degree Requirements
  - [ ] Admission Standards/ Application Requirements
  - [ ] Other Changes: _____

Type (Check one)**:**

- [ ] B.A. [ ] B.S. [ ] Minor (req. C3 approval)
- [ ] M.A. [x] M.S. [ ] M.Ed.
- [ ] Ph.D.
- [ ] Undergraduate Certificate* (req. C3 approval)
- [ ] Graduate Certificate*
- [ ] Bachelor's/Accelerated Master's [ ] Other:

College/School:	COS	**Department:**	AOES		
Submitted by:	Barry Klinger	**Ext:**	3-9227	**Email:**	bklinger@gmu.edu

Effective Term: Fall 2016

Please note: For students to be admitted to a new degree, minor, certificate or concentration, the program must be fully approved, entered into Banner, and published in the University Catalog.

Justification: (attach separate document if necessary)

See following pages.

	Existing	New/Modified
Program Title: (Required) Title must identify subject matter. Do not include name of college/school/dept.	Earth Systems Science, MS (AOES)	
Concentration(s):		
Admissions Standards / Application Requirements: (Required only if different from those listed in the University Catalog)		
Degree Requirements: Consult University Catalog for models, attach separate document if necessary using track changes for modifications		See attached pages.
Courses offered via distance: (if applicable)		
TOTAL CREDITS REQUIRED:		

***For Certificates Only:** Indicate whether students are able to pursue on a [ ] **Full-time basis** [ ] **Part-time basis**

Approval Signatures

Department Date | College/School Date | Provost's Office Date

Required for Minors and Interdisciplinary Programs

If this program may impact another unit or is in collaboration with another unit at Mason, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Minors and UG Certificates only (Cross-College Curriculum Committee Approval)

C3 Committee Member | Provost Office | C3 Committee Approval Date

For Graduate Programs Only

Graduate Council Member | Provost Office | Graduate Council Approval Date

For Registrar Office's Use Only: Received_____Banner_____Catalog_____

revised 7/1/15

Program Proposal Submitted to the College of Science Curriculum Committee (COSCC)

The form above is processed by the Office of the University Registrar. This second page is for the COSCC's reference. Please complete the applicable portions of this page to clearly communicate what the form above is requesting.

FOR ALL PROGRAMS (required)

Program Title: Earth Systems Science (AOES)

Date of Departmental Approval:

FOR MODIFIED PROGRAMS (required if modifying a program)

- Summary of the Modification:

Increase course options by adding CLIM options to program requirements:
Adding CLIM 712 to **Hydrosphere** Core,
adding GEOL 506 to **Lithosphere** Core,
adding CLIM 991 to **Seminar** requirement (as alternative to GEOL seminars)
adding CLIM 799 to **thesis** requirement, and
adding CLIM 700 and CLIM 798 to **project** requirement.

- Text before Modification (title, degree requirements, etc.): see following pages

- Text after Modification (title, degree requirements, etc.): see following pages

- Reason for the Modification:

Last year the ESS MS was modified to reflect changes in Earth Science course offerings since the degree was originally created. This has allowed the program to better attract students with an interest in Earth Science. Atmospheric science and climate are also intrinsic aspects of Earth System Science which are comprehensively covered by CLIM courses taught by the large Climate Dynamics faculty within AOES. Therefore the program is being modified to give students a greater choice of CLIM courses to fulfill program requirements. These modifications should better attract students interested in climate, increasing enrollment and taking advantage of an important strength of the AOES Department.

The changes to seminar, thesis, and project requirements follow directly from the goals described above. CLIM 712 is a more mathematical version of current Hydrosphere course CLIM 512.

- Text before Modification (title, degree requirements, etc.):

Earth Systems Science, MS (AOES)

Degree Requirements

Candidates must successfully complete 30 credits outlined below, being mindful that 10 of these credits must be GGS courses and 10 of these credits must be GEOL/CLIM courses ("Culminating Experience" credits do not count towards this requirement):

Earth Science Core (9 credits)

Choose one course from each of the following groups:

Atmosphere

- CLIM 710 - Introduction to Physical Climate System Credits: 3
- CLIM 714 - Land-Climate Interactions Credits: 3
- GEOL 532 - Paleoclimatology Credits: 3
- GGS 670 - Introduction to Atmosphere and Weather Credits: 3
- PHYS 575 - Atmospheric Physics I Credits: 3

Hydrosphere

- CLIM 512 - Physical Oceanography Credits: 3
- GEOL 513 - Hydrogeology Credits: 3
- GGS 656 - The Hydrosphere Credits: 3

Lithosphere

- GGS 657 - The Lithosphere Credits: 3 **or** GEOL 601 - The Lithosphere Credits: 3

Techniques (6 credits)

Select two courses from the following:

- GGS 553 - Geographic Information System Credits: 3
- GGS 560 - Quantitative Methods Credits: 3
- GGS 579 - Remote Sensing Credits: 3

- GGS 680 - Earth Image Processing Credits: 3
- GGS 754 - Earth Science Data and Advanced Data Analysis Credits: 3
- Courses can be substituted with advisor approval.

Colloquium (2 credits)

- GEOL 536 - Paleontology Seminar Credits: 1 **or** GEOL 792 - Seminar in Earth Systems Science, Geology, & Earth Science Credits: 1
- GGS 900 - Colloquium Earth Systems Sciences Credits: 1

Electives (10 credits)

Complete 10 credits of other CLIM, GEOL, GGS, or EVPP courses at the 500 to 900-level (excluding 700, 798, and 799 courses).

Culminating Experience (3 credits)

Choose the culminating experience of either a thesis (totaling 3 credits) **or** a project (totaling 3 credits):

Thesis

- GGS 799 - Thesis Credits: 1-6 **or** GEOL 799 - Master's Thesis in Earth Systems Science Credits: 1-6

Project

- GGS 700 - Comprehensive Exam Credits: 1 **or** GEOL 700 - Comprehensive Exam Credits: 1**, and**
- GGS 798 - Research Project in Earth Systems Science Credits: 1-6 **or** GEOL 798 - Master's Research Project in Earth Systems Science Credits: 1-6

Degree Total: 30 credits

- Text after Modification (title, degree requirements, etc.):

Earth Systems Science, MS (AOES)

Degree Requirements

Candidates must successfully complete 30 credits outlined below, being mindful that 10 of these credits must be GGS courses and 10 of these credits must be GEOL/CLIM courses ("Culminating Experience" credits do not count towards this requirement):

Earth Science Core (9 credits)

Choose one course from each of the following groups:

Atmosphere

- CLIM 710 - Introduction to Physical Climate System Credits: 3
- CLIM 714 - Land-Climate Interactions Credits: 3
- GEOL 532 - Paleoclimatology Credits: 3
- GGS 670 - Introduction to Atmosphere and Weather Credits: 3
- PHYS 575 - Atmospheric Physics I Credits: 3

Hydrosphere

- CLIM 512 - Physical Oceanography Credits: 3
- CLIM 712 Physical and Dynamical Oceanography Credits: 3
- GEOL 513 - Hydrogeology Credits: 3
- GGS 656 - The Hydrosphere Credits: 3

Lithosphere

- GGS 657 - The Lithosphere Credits: 3 **or** GEOL 601 - The Lithosphere Credits: 3
- GEOL 506 - Soil Science

Techniques (6 credits)

Select two courses from the following:

- GGS 553 - Geographic Information System Credits: 3

- GGS 560 - Quantitative Methods Credits: 3
- GGS 579 - Remote Sensing Credits: 3
- GGS 680 - Earth Image Processing Credits: 3
- GGS 754 - Earth Science Data and Advanced Data Analysis Credits: 3
- Courses can be substituted with advisor approval.

Colloquium (2 credits)

- GEOL 536 - Paleontology Seminar Credits: 1 **or** GEOL 792 - Seminar in Earth Systems Science, Geology, & Earth Science **or** CLIM 991 – Climate Dynamics Seminar Credits: 1
- GGS 900 - Colloquium Earth Systems Sciences Credits: 1

Electives (10 credits)

Complete 10 credits of other CLIM, GEOL, GGS, or EVPP courses at the 500 to 900-level (excluding 700, 798, and 799 courses).

Culminating Experience (3 credits)

Choose the culminating experience of either a thesis (totaling 3 credits) **or** a project (totaling 3 credits):

Thesis

- GGS 799 - Thesis **or** GEOL 799 - Master's Thesis in Earth Systems Science Credits: 1-6 or CLIM 799 – MS Thesis

Project

- CLIM 798 - MS Research Project
- GGS 700 - Comprehensive Exam Credits: 1 **or** GEOL 700 - Comprehensive Exam Credits: 1**, or** CLIM 700 Climate Comprehensive Exam Credits: 1, **and**

GGS 798 - Research Project in Earth Systems Science Credits: 1-6 **or** GEOL 798 - Master's Research Project in Earth Systems Science Credits: 1-6 , **or** CLIM 798 MS Research Project Credits 1-6

- **Degree Total: 30 credits**