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
- [ ] M.A. [x] M.S. [ ] M.Ed.
- [ ] Ph.D.
- [ ] Undergraduate Certificate*
- [ ] Graduate Certificate*
- [ ] Other:

College/School:	COS	**Department:**	SPACS		
Submitted by:	Chi Yang	**Ext:**	3-4077	**Email:**	cyang@gmu.edu

Effective Term: Fall 2014

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 attachment.

	Existing	New/Modified
Program Title: (Required) Title must identify subject matter. Do not include name of college/school/dept.	Computational Science	Computational Science
Concentration(s):	none	none
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 attachment	See attachment
Courses offered via distance: (if applicable)		
TOTAL CREDITS REQUIRED:	30	30

***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 *Interdisciplinary Council Use Only*	Date

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 Graduate Programs Only

Graduate Council Member	Provost Office	Graduate Council Approval Date

For Registrar Office's Use Only: Received_____Banner_____Catalog_____

revised 6/7/12

Justification

Two new faculty members associated with the newly established research center, Center for Collision Safety and Analysis (CCSA), joined SPACS in the fall of 2013. The mission of CCSA is to conduct research in transportation safety and security for government agencies, and automotive and manufacturing industries, and to provide focused education programs for transportation safety and security. The research focus of CCSA is to apply state-of-the-art computer modeling and simulation technologies, combining real world data analysis, and experimental test methods to optimize transportation safety and to solve safety and security related problems.

In order to accommodate the needs of the future students of CCSA, and also strengthen our current MS Program in Computational Science, we made some minor adjustments to the degree requirements and format changes to be more consistent with other SPACS' MS degree program. The main changes are as follows:

- 15 credits of computational electives ➔ 12 credits of computational electives
- 6 credits of electives ➔ 9 credits of electives

3 more credits are added to the electives and no more than 6 credits of electives may be chosen from areas outside CSI, which will allow students to take a maximum of 6 credits of courses from other disciplines after they consult with their academic advisors.

9 credits of electives can also include a maximum of 3 credits of CSI 796, Directed Reading and Research. This change will add flexibilities to the program.

In addition, we have also made some changes to the catalog description of the program, and divide the program into three areas of emphasis (Modeling & Simulation, Data Science, and Transportation Safety) to help students better identify the program. The new program description is more consistent with other SPACS' MS degree program (Applied and Engineering Physics, MS).

Degree Requirements

Current requirements:

Candidates must successfully complete 30 credits as follows:

Three courses (9 credits) from the computational core, chosen from:

- CSI 700 - Numerical Methods Credits: 3*
- CSI 701 - Foundations of Computational Science Credits: 3
- CSI 702 - High-Performance Computing Credits: 3
- CSI 703 - Scientific and Statistical Visualization Credits: 3
- CSI 710 - Scientific Databases Credits: 3*

Computational electives (15 credits)

- 15 credits of CSI courses listed in the catalog **not including** CSI 796, 798, 799, 898, 899, 991 and 996.

Scientific electives (6 credits)

- Two 3-credit courses approved by the student's advisor.
- Students can apply 6 credits of CSI 799 - Master's Thesis Credits: 1-6 or 3 credits of CSI 798 - Research Project Credits: 3 towards the elective requirement.

Total: 30 credits

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***Note:** CSI 700 and CSI 710 have been changed to CSI 690 and CSI 695, respectively, which will be in effect in the spring of 2014.

New requirements:

Candidates must successfully complete **30** credits chosen in the categories shown below to create a study plan for an area of emphasis or combined areas of emphasis in consultation with their academic advisors:

9 credits of required core courses, chosen from:

- CSI 690 - Numerical Methods Credits: 3
- CSI 695 - Scientific Databases Credits: 3
- CSI 701 - Foundations of Computational Science Credits: 3
- CSI 702 - High-Performance Computing Credits: 3
- CSI 703 - Scientific and Statistical Visualization Credits: 3

12 credits of computational electives

- 12 credits of CSI courses listed in the catalog not including CSI 796, 798, 799, 898, 899, 991 and 996.

9 credits of electives typically chosen from:

Physics, chemistry, mathematics, statistics, engineering, information technology, and computational sciences and informatics. No more than 6 credits may be chosen from areas outside CSI.

Elective credits may also include:

- CSI 796 - Directed Reading and Research Credits: 1-3
- CSI 798 - Research Project Credits: 1-3
- CSI 799 - Master's Thesis Credits: 1-6

Total: 30 credits

MS in Computational Science

Current catalog description of the program:

The master's program in computational science addresses the growing national and regional demand for trained computational scientists. It combines a solid foundation in information technology skills with computational courses in a variety of scientific areas. All courses are offered in the late afternoon or early evening to accommodate students with full-time employment outside the university.

The 30 credit hour curriculum is centered on a strong computational component, comprising 9 credits of core courses, with the remaining 21 credits taken in a broad range of scientific areas chosen from the different concentrations in the CSI PhD curriculum. This provides students with a flexible set of options that can be used to create their own customized curriculum under the guidance of a faculty advisor. Students are encouraged to undertake an optional master's thesis or research project that allows them to gain useful experience in the development of simulations and other aspects of computational science.

This program of study is offered by the School of Physics, Astronomy, and Computational Sciences in the College of Science.

New catalog description of the program:

The master's program in computational science addresses the growing demand for trained computational scientists and engineers, and data scientists. It combines a solid foundation in information technology skills with computational courses in a variety of scientific and engineering areas, where large-scale simulation, data analysis, and high performance computing play a central role.

The program is divided into three areas of emphasis:

- **Modeling & Simulation** emphasis is intended for students who wish to learn computational solution techniques for modeling and simulation of scientific and engineering phenomena.
- **Data Science** emphasis is intended for students who wish to learn computational methods for acquiring, extracting and analyzing large-scale data obtained by observations, experiments, modeling, and database searches.
- **Transportation Safety** emphasis is intended for students who wish to gain skills in modeling and simulation analysis for automotive crashworthiness and occupant safety, as well as other impact related applications.

Students may also combine the areas of emphasis to create their own customized curriculum under the guidance of a faculty advisor.

Most of the courses are offered in the late afternoon or early evening to accommodate students with full-time employment outside the university.

This program of study is administrated by the School of Physics, Astronomy, and Computational Sciences in the College of Science.