

Program Change Request

Date Submitted: 02/10/23 2:22 pm

Viewing: **SC-PHD-CSI : Computational Sciences and Informatics, PhD**

Last approved: 06/02/22 9:43 am

Last edit: 02/10/23 2:22 pm

Changes proposed by: jbazaz

Catalog Pages
Using this Program

[Computational Sciences and Informatics, PhD](#)

No Longer
Anticipated closure
Rationale for

Are you completing this form on someone else's behalf?

Yes

Requestor:

In Workflow

1. CDS Chair
2. SC Curriculum Committee
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Programs

Approval Path

1. 02/10/23 3:37 pm
Jason Kinser
(jkinser): Approved for CDS Chair

History

1. Oct 23, 2017 by clmig-jwehrheim
2. Feb 15, 2018 by rzachari
3. Mar 14, 2018 by pchampan
4. Jan 29, 2021 by Jennifer Bazaz Gettys (jbazaz)
5. Feb 23, 2021 by jriemen
6. Mar 3, 2021 by jriemen
7. Mar 5, 2021 by jriemen
8. Apr 27, 2022 by Jennifer Bazaz Gettys (jbazaz)
9. Jun 2, 2022 by Tory Sarro (vsarro)

Name	Extension	Email
Estela Blaisten	1988	blaisten@gmu.edu

Effective Catalog: 2023-2024

Program Level: Graduate

Program Type: Doctoral

Degree Type: Doctor of Philosophy

Title: Computational Sciences and Informatics, PhD

Approval Criteria

1. What was the process used within your department to create the badge?
 2. What evidence was used to identify the badge's content?
 3. Have you ensured there are no other existing badges with similar content?
 4. Has CPE confirmed the proposed badge design?
 5. Has the instructor(s) for this badge experience in creating and assessing digital badges?
 6. Does this badge provide a benefit for current students?
5. Is this badge co-sponsored with another organization, program, or department?
- a. What is the organization, program, or department?

Earning Criteria

Course:

Badge:

Department:

Document:

Portfolio:

Presentation:

Assessment:

Credential:

Education

Other:

Project:

Professional

Schedule/Registration:

Volunteer:

Skills Tag

Skills Tag

Badge Attributes

Please select one from each category:

Achievement Type:

Mastery Level:

Time Commitment:

Cost:

Industry Standards:

Recommendations:

Issuance information and Pricing

Pricing: See <https://cpe.gmu.edu/digitalbadgespricing/> for more information.

Estimated Number of Badges Expected to be Issued:

Notes:

- All badge requests will be sent to CPE for review and approval. Please email estela.blaisten@gmu.edu with your request.
- A Mason Digital Credentials Advisory Group may be developed to review badge requests.

Banner Title:

Computat Sci & Informatics PhD

Is this a retitling of an existing program?

Existing Program

Registrar/OAPI Use Only – SCHEV Status Approved

Registrar’s Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter

Registrar/OAPI Use Only – SACSCOC Status

Concentration(s):

INTO Major(s):

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: Computational & Data Sciences

Jointly Owned Program? No

Participating

Participating

Justification

What: The proposed changes affect three partitions of the requirements as follows:

1. In the Emphasis Areas Courses, two bullets are created:

- o Any course not applied toward the ‘General Core’ requirements
- o Courses from the list below:

The new list eliminates the following 14 courses from the catalog listing: CSI 676 Regression Analysis

CSI 690 Numerical Methods

CSI 695 Scientific Databases

CSI 701 Foundations of Computational Science CSI 702 High-Performance Computing

CSI 703 Scientific and Statistical Visualization CSI 739 Topics in Bioinformatics

CSI 744 Linear and Nonlinear Modeling in the Natural Sciences CSI 754 Earth Science Data and Advanced Data Analysis

CSI 771 Computational Statistics

CSI 787 Computational Materials Science CSI 788 Simulation of Large Scale Systems CSI 876

Measure and Linear Spaces

CSI 877 Geometric Methods in Statistics

In addition, a new note is added for the two 500-level listed courses:

CSI 500 Computational Science Tools¹

or CSI 501 Introduction to Scientific Programming¹

1 Only one 500-level course may be applied toward the 18-credit requirement

2. In the Colloquium/Seminar, the option below is eliminated: or CSI 991 Seminar in Scientific Computing

3. In the Electives an extra bullet is added for a total of four. The first two bullets have language simplification consistent with previous changes, the third bullet is left intact, and the fourth new bullet adds a list of possibilities termed Suggested Elective Courses as follows:

a. Any course in the 'Areas of Emphasis Courses' not applied toward those requisites.

b. Other CSI courses such as:

CSI 739 Topics in Bioinformatics

CSI 779 Topics in Computational Statistics CSI 789 Topics in Computational Physics

CSI 986 Topics in Large Scale Molecular Simulation

c. Other interdisciplinary graduate courses across Mason's offerings. These courses should be chosen with the student's research supervisor guidance for enhancing their ability of performing doctoral research within the two emphases, Computer Modeling and Simulation and Data Science. Endorsement of the Computational and Data Sciences Department for applying these courses toward the 'Electives' requirement is required.

Why:

1. A simplification of the Areas of Emphasis Courses by eliminating 14 courses that are now deactivated or in the zombie course list helps the students build a realistic course schedule. It also helps the advising.

2. A clarification in the Colloquium/Seminar Courses that eliminates from the options a deactivated course.

3. The Electives courses student election is made clarified and the restriction of interdisciplinary courses to be from COS uniquely is expanded.

Catalog Published Information

Total Credits Total: 72 credits

Required:

Registrar's Office Use Only - Program Code:

SC-PHD-CSI

**Registrar/IRR Use
Only – Program CIP
Code**

**Admission
Requirements:**

Admissions

University-wide admissions policies can be found in the [Graduate Admissions Policies](#) section of this catalog. To apply for this program, please complete the [George Mason University Admissions Application](#).

Eligibility

Students interested in applying for admission should have a bachelor's degree in computational science, any natural science, mathematics, engineering, or computer science with a minimum GPA of 3.00 in their last 60 credits of study. Applicants to the PhD program should have a mathematics background up to and including differential equations and should also have knowledge of a computer programming language such as C, C++, Fortran, Python, etc.

Application Requirements

The GRE is required, unless the applicant holds a master's degree from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent. An acceptable TOEFL score (as determined by the university) is required for international students; for more information visit the [Admission of International Students](#) section of the catalog. The ETS code for Mason is 5827.

Students should submit a completed [George Mason University Admissions Application](#) along with two letters of recommendation, an expanded goals statement, and application fee in addition to the items listed above.

Application deadlines can be found on the [Office of Admissions website](#).

For additional information, please contact the CSI graduate coordinator.

Program-Specific Policies:

Policies

For policies governing all graduate degrees, see [AP.6 Graduate Policies](#).

Reduction of Credit

For students entering the doctoral program with a master's degree in a related field from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent, the required coursework may be reduced up to 24 credits, subject to approval of the graduate coordinator and the college's associate dean. Research-based courses and seminar courses are not eligible for reduction.

Transfer of Credit

Students who have prior graduate coursework that has not been applied to any degree may request to have a maximum of 30 of those graduate credits transferred, with approval of the graduate coordinator, the college's associate dean, and in accord with university policy. Research-based courses and seminar courses are not eligible for transfer.

Degree Requirements:

Students should refer to the [Admissions & Policies](#) tab for specific policies related to this program.

General Core Courses

Select two courses (6 credits) from the following:

[CSI 690](#)

Numerical Methods

6

CSI 695	Scientific Databases
CSI 702	High-Performance Computing
CSI 703	Scientific and Statistical Visualization

Total Credits

6

Areas of Emphasis Courses

Select 18 credits from From the list below, students are advised to select six courses listed below. that correspond to areas of emphasis in: The selected courses may include 'General Core Courses' not applied toward those requirements. Data Science- Including computational learning, statistics, and data analytics

Select six courses (18 credits) from the following:

18

CSI 500	Computational Science Tools 1
or CSI 501	Introduction to Scientific Programming
CSI 501	Introduction to Scientific Programming
CSI 672	Statistical Inference
CSI 674	Bayesian Inference and Decision Theory
CSI 676	Regression Analysis
CSI 678	Times Series Analysis and Forecasting
CSI 685	Fundamentals of Materials Science
CSI 690	Numerical Methods
CSI 695	Scientific Databases
CSI 701	Foundations of Computational Science
CSI 702	High-Performance Computing
CSI 703	Scientific and Statistical Visualization
CSI 709	Topics in Computational Sciences and Informatics
CSI 721	Computational Fluid Dynamics I
CSI 739	Topics in Bioinformatics
CSI 740	Numerical Linear Algebra
CSI 742	The Mathematics of the Finite Element Method
CSI 744	Linear and Nonlinear Modeling in the Natural Sciences
CSI 747	Nonlinear Optimization and Applications
CSI 754	Earth Science Data and Advanced Data Analysis
CSI 758	Visualization and Modeling of Complex Systems
CSI 771	Computational Statistics
CSI 772	Statistical Learning
CSI 773	Statistical Graphics and Data Exploration
CSI 777	Principles of Knowledge Mining
CSI 780	Principles of Modeling and Simulation in Science
CSI 782	Statistical Mechanics for Modeling and Simulation
CSI 783	Computational Quantum Mechanics
CSI 786	Molecular Dynamics Modeling
CSI 787	Computational Materials Science
CSI 788	Simulation of Large Scale Systems
CSI 873	Computational Learning and Discovery

CSI-876	Measure and Linear Spaces
CSI-877	Geometric Methods in Statistics

Total Credits

18

- 1 Only one 500-level course may be applied toward the 18 credit requirement.

~~Computer Modeling and Simulation—Including applications to the natural sciences~~ Colloquium/Seminar

The department offers weekly colloquia and seminar series to ensure that students are exposed to the latest developments at area research institutions. One credit may be chosen from:

CSI 898	Research Colloquium in Computational Sciences and Informatics	1
or CSI 899	Colloquium in Computational and Data Sciences	

Total Credits

1

Electives

Electives should be chosen to bring the total number of **coursework** credits to **48. 72**. Courses must be approved by the student's advisor and the graduate coordinator. Additionally,

- A maximum of 2 credits of **CSI 898 Research Colloquium in Computational Sciences and Informatics and/or CSI 899 Colloquium in Computational and Data Sciences** may ~~CSI-898 Research Colloquium in Computational Sciences and Informatics, CSI-899 Colloquium in Computational and Data Sciences, and/or CSI-991 Seminar in Scientific Computing may~~ be applied as electives.
- A maximum of two 500-level courses may be applied between both the 'Areas of Emphasis Courses' requirement and the 'Electives' requirement.
- **CSI 796** Directed Reading and Research and **CSI 996 Doctoral Reading and Research** may ~~CSI-996 Doctoral Reading and Research are the only allowable research-based courses that can~~ be used as electives.
- The following courses may not be used as electives: **CSI 798** Research Project, **CSI 799** Master's Thesis, **CSI 998** Doctoral Dissertation Proposal, and **CSI 999** Doctoral Dissertation.
- **Suggested elective courses include:**
 - **Any course in the 'Areas of Emphasis' not applied toward those requisites.**
 - **Other CSI courses such as: CSI 739 Topics in Bioinformatics, CSI 779 Topics in Computational Statistics, CSI 789 Topics in Computational Physics, and CSI 986 Advanced Topics in Large-Scale Physical Simulation.**
 - **Other interdisciplinary graduate courses across Mason's offerings. These courses should be chosen with the student's research supervisor for guidance on enhancing the student's ability to perform doctoral research within the emphases. Endorsement of the Computational and Data Sciences Department for applying these courses toward the 'Electives' requirement is required.**

~~Students may pursue interdisciplinary research that supplements the 'Areas of Emphasis Courses' and 'Electives' requirements with each other and also with bioinformatics, climate dynamics, computational chemistry, computational social science, geoinformation sciences, and several other~~

~~autonomous PhD program areas within the College of Science.~~ Doctoral

Research

No more than 24 combined credits from [CSI 998](#) Doctoral Dissertation Proposal and [CSI 999](#) Doctoral Dissertation may be applied toward satisfying doctoral degree requirements, with a minimum of 6 credits of [CSI 999](#) Doctoral Dissertation. Students become eligible to register for [CSI 998](#) Doctoral Dissertation Proposal upon having an approved dissertation committee. Upon advancement to candidacy, students will be eligible to register for [CSI 999](#) Doctoral Dissertation.

Select 24 credits from the following: 24

[CSI 998](#) Doctoral Dissertation Proposal

[CSI 999](#) Doctoral Dissertation

Total Credits 24

Candidacy Examination

The student must successfully complete separate written, computational, and oral candidacy examinations prepared and administered by the student's dissertation committee.

Dissertation Proposal and Advancement to Candidacy

Students advance to doctoral candidacy by fulfilling the following requirements:

- The student must successfully complete all coursework and candidacy examinations as stated above.
- The student prepares a dissertation proposal describing in detail the planned dissertation research. The proposal must be approved by the dissertation committee.
- Following successful completion of the research proposal and candidacy exams, the committee will recommend the student for advancement to doctoral candidacy to the graduate coordinator and the college's associate dean.

Dissertation Research and Defense

After advancing to candidacy, the student will work on a doctoral dissertation while enrolled in [CSI 999](#) Doctoral Dissertation. The dissertation is a written piece of original contribution that demonstrates a doctoral candidate's mastery of the subject matter. A student is expected to produce new and original research worthy of publication in peer-reviewed journals. After the dissertation is completed, the committee will review the dissertation and examine the student in a public oral dissertation defense.

**Retroactive
Requirements
Updates:**

Plan of Study:

**Honors
Information:**

**Accelerated
Description/Dual
Degree
Description:**

**INTO-Mason
Requirements:**

**College
Requirements &
Policies:**

**Department /
Academic Unit
Requirements &
Policies:**

Program Outcomes**Additional Program Information**

This information is required by the Office of Accreditation and Program Integrity.

Courses offered via distance (if applicable):

Indicate whether students are able

What is the primary delivery format for the program?
Face-to-Face Only

Does any portion of this program occur off-campus?

No

Off-campus details:

Are you working with a vendor / other collaborators to offer your program?

No

Please explain:

Related Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

No

Please explain:

Are you adding or removing a licensure component?

No

Please explain:

Additional SCHEV & SACSCOC Information

Is the content of the new program closely related to that of an existing approved program at the same instructional level (i.e., baccalaureate, master's, doctoral)?

Which existing approved program(s)?

Is this new program considered to be "advancing the degree level of a currently approved program (i.e. existing content is at lower degree level, new content is at the higher degree level)?"

Which existing approved program(s)?

Is this new program considered to be "lowering the degree level of a currently approved program" (i.e. existing content is at higher degree level, new content is at the lower degree level)?"

Which existing approved program(s)?

Is this a re-opening of a program that was closed to admission within the last five years?

Date of Program Closure

What are the methods of delivery for the program?

Does this program include a course/credit-based competency-based education delivery option?

Is this change a simple retitling of an existing program, with no other changes, to any existing program content, curriculum requirements, etc?

No

Does this change represent a repackaging of content in an existing approved degree/certificate program at the same instructional level (i.e., baccalaureate, master's, or doctoral)?

No

Which existing approved program(s)?

Percentage of total credits containing new course content. ("New course content" is defined by SACSCOC as content that is not currently included in an existing approved degree/certificate program at the same instructional level. Do not exclude gen ed credits in calculations for undergraduate programs.)

0%-24%

Does this change include the addition of a distance education or face-to-face method of delivery for this program?

No

What is the new method of delivery?

Does this change include the addition of a course/credit-based competency-based education delivery option?

No

Will any additional equipment/facilities be needed?

No

Description of institutional impact:

Will any additional faculty be required?

No

Description of institutional impact:

Will any additional financial resources be needed?

No

Description of institutional impact:

Additional library/learning resources needed?

No

Description of institutional impact:

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Green Leaf Program Designation

Is this a Green Leaf program? No

Green Leaf Designation

Sustainability-focused academic programs require at least one green leaf course. Either that course is itself sustainability-focused or else the program requires a set of sustainability-related courses with aggregated

Relationship to Existing Courses

Relationship to Existing Programs

List sustainability-focused courses currently required in the degree

Sustainability-related academic programs either require at least one sustainability-related course or else offer any green leaf course as an option or elective *

List sustainability-related courses currently required in the degree

Does this program cover material which crosses into another department?

No

Impacted Departments

Additional Attachments

SCHEV Proposal

Executive Summary

**Reviewer
Comments**

**Additional
Comments**

Is this course required of all students in this degree program?

[%wi_required.eshtml%](#)

**Attached
Document**

[%attach_document.eshtml%](#)

Key: 25