UNIVERSITY OF MARY WASHINGTON – PROGRAM CHANGE PROPOSAL

Electronically submit this completed form with attachments in one file to the Chair of the College Curriculum Committee.

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<tr>
<th>COLLEGE (check two):</th>
<th>Arts and Sciences</th>
<th>X</th>
<th>Business</th>
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<th>Education</th>
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Proposal Submitted By: Stephen Davies, Debbie Hydorn, Chris Garcia, Karen Anewalt

Date Prepared: Fall 2014

Department /Program: CPSC, MATH (CAS), BUAD (COB)

Note: for any program change entailing the addition any new courses, or revisions to existing courses, separate proposal for those course actions must also be submitted.

PROPOSAL TO CHANGE EXISTING PROGRAM (check no than one of the following)

| Revise requirements for existing major |
| Revise requirements for a concentration within an existing major |
| Revise requirements for an existing degree program |
| Revise requirements for existing certificate program |
| Revise requirements for existing minor |

Implementation Date: FALL semester, year: 2015

REQUIRED ATTACHMENTS FOR CHANGES TO EXISTING PROGRAMS:

1. **Rationale statement** (Why is this program change needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of the program change are required.)
3. **Catalog Copy** (Provide the existing Catalog Description and the complete statement of the proposed new Catalog description that reflects the program changes)

PROPOSAL TO CREATE NEW PROGRAM NOT REQUIRING STATE ACTION

(check no more that one of the following)

| New concentration within existing major | Name: |
| New minor | Name: |
| New Major but NOT a new degree* | Name: |

*Use ONLY for interdisciplinary majors that will be grouped as part of the “Special Majors/General Liberal Arts and Sciences” degree (CIP Code 24.0101) or reported as a BLS degree (CIP Code 24.0199)

Implementation Date (semester and year):

REQUIRED ATTACHMENTS FOR NEW PROGRAMS NOT REQUIRING STATE APPROVAL:

1. **Rationale statement** (Why is this additional program needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of adding the new program are required.)
3. **Catalog Copy** (Provide the complete Catalog Description for the proposed new program)

Department Chair Approval: Jennifer Polack  
Date: 11/10/14

CCC Chair Approval:  
Date: 11/20/14

Dean Approval:  
Date:

UCC Chair Approval:  
Date:

*Provost Approval:  
Date:

*Required only in cases of proposals for new concentrations, new minors, or new majors that do not involve a new degree.

Program Change Proposal Cover Sheet (July 2013)
The Data Science program committee (Drs. Stephen Davies and Karen Anewalt (CAS–CPSC), Debbie Hydorn (CAS–MATH), and Chris Garcia (COB–BUAD)) seeks to streamline and improve the requirements for the Data Science minor.

The main reason these changes are required is honestly that UMW is new to this fast-moving, interdisciplinary field and we’re incrementally figuring it out. The existing minor, though exciting and rigorous, is somewhat scattered in its scope. In particular, we were previously trying to bridge the gap between two related but distinct fields: Data Science proper, which involves principles of discovering knowledge from data-generating processes, and “Computational Science,” which focuses more on implementation concerns. Hence we offered students the choice of taking CPSC 425 (Parallel Processing), and the required prerequisite (CPSC 230 – Data Structures and Algorithms) instead of courses more specifically in simulation and analytics. In hindsight we recognize that the CPSC 230/425 sequence is really too far afield for what we intend to brand “Data Science,” and we wish to channel students more specifically into analytics content.

The existing minor has also anecdotally proven to be a burden for students to complete, in part because it is so large (23 credits). During multiple planning sessions we realized that the size was more a matter of us trying to “stretch” into multiple content areas than it was due to an irreducible quantity of material. What emerged from those conversations was unanimity and enthusiasm for a more consolidated, more focused minor.

The current minor requirements read as follows:

Twenty-three (23) credits to include Mathematics (MATH) 200; MATH 300; Computer Science (CPSC) 220; CPSC 419; CPSC 420; 4 elective credits from among CPSC 230 or Business Administration (BUAD) 400; 3 elective credits from among BUAD 403 or CPSC 425. Note that MATH 121 and 122 are prerequisites to MATH 300, and either MATH 201 or CPSC 125 is a prerequisite to MATH 300. Students should bear this in mind when planning their academic coursework.

Requiring both CPSC 419 and 420 puts the minor out of reach for many students (in part because we can only offer these courses on a rotating basis). Requiring CPSC 220 for all Data Science students is actually unnecessary: Data Science isn’t principally about programming, but data analysis, and the type of programming employed (lighter-weight, script-based, API-focused) is more properly taught in the BUAD/CPSC 219 and BUAD 4xx courses than in CPSC 220, a traditional compiled programming course. And as mentioned above, the CPSC 230/425 option clutters the requirements and spreads the minor too thin.

We wish to change these requirements to read:
Fifteen (15) credits to include: MATH 200, BUAD/CPSC 219, and any three (3) of the following: BUAD 400, BUAD 403, CPSC 419, CPSC 420, MATH 300, or any approved substitute BUAD, CPSC, or MATH course numbered 300 or higher.

We believe that these five courses comprise a strong yet achievable curriculum of the correct breadth. Students receive basic training in statistical methods (MATH 200), the tools for manipulating and preparing data for analysis (BUAD/CPSC 219), and three electives exploring key topics in Data Science. The BUAD electives emphasize analytics application development; the CPSC electives, the twin fields of simulation and data mining; the MATH elective, matrix-based data representation. The final item in the list affords students the opportunity to either apply their knowledge in the field to a research project, or gain additional exposure to cutting-edge developments in the field through a “special topics” course related to data science (such as an approved MATH 461, CPSC 370, CPSC 470).

Additional notes:

1. The current catalog incorrectly lists the minor as “Data Sciences” (plural) when it should in fact be called “Data Science.” We wish this to be changed everywhere it occurs in the catalog, to conform with our intentions and with standard industry nomenclature.

2. We wish to add the following preamble to the Data Science program description, in the spirit of the Digital Studies and Urban Studies minors:

DATA SCIENCE
   Stephen Davies, Program Director, Department of Computer Science

Affiliated Faculty
   Karen Anewalt, Professor of Computer Science
   Chris Garcia, Assistant Professor of Business
   Debra Hydorn, Professor of Mathematics