UNIVERSITY OF MARY WASHINGTON -- NEW COURSE PROPOSAL

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

COLLEGE (check one):	**Arts and Sciences**		**Business**	X	**Education**		
Proposal Submitted By: Chris Garcia			Date Prepared: 10/23/2018				
Course Title:	Analytics I: Predictive Models						
Department/discipline and course number*:	DSCI 352 (Also to be cross-listed as DATA 352)						
Prerequisites:	STAT 180 or equivalent						

**This course number must be approved by the Office of the Registrar before the proposal is submitted.*

Number of credits:	3	Will this course meet for at least 700 contact minutes for each credit hour proposed? ***If no, provide a credit hour justification.***	**YES**	X	**NO**	
Will this be a ***new***, *repeatable* "special topics" course? (Do you want students to be able to take this new course more than once if the topic changes?)			**NO**	X	**YES**	

Date of first offering of this ***new*** course: **FALL SEMESTER, year**	Fall 2019				
Proposed frequency of offering of the course:	Every semester				
Proposed enrollment limit for the course:	N/A				
List the faculty who will likely teach the course:	Garcia, Fontem, Zhao				
Are ANY new resources required?	**NO**	*X*	**YES**		*Document in attached impact statement*

**The earliest the course may be offered is the fall semester of the academic year FOLLOWING the year in which the course proposal is approved.

This new course will be (check all that apply):					
Required in the major	X	Required in the minor		General Elective	X
Elective in the major		Elective in the minor		General Education**	

***AFTER the new course is approved, a separate proposal must be sent to the General Education Committee.*

Catalog Description (suggested length – less than 50 words)**:**
This course will introduce students to data visualization methods as well as essential predictive modeling approaches widely used in analytics practice today. Beginning with a foundation in inferential statistics, the course will cover regression, classification, time series, and clustering models. The use of visualization both to explore data and to create narratives around data will also be emphasized.

COURSE HISTORY:	Was this course taught previously as a topics or experimental course?	**YES**		**NO**	X
Course Number and Title of Previous Course		**Semester Offered**		**Enrollment**	

	CHECK HERE if the proposed course is to be ***equated*** with the earlier topics or experimental offerings. If equated, students who took the earlier "topics" course will only be able to take the new course as a repeat (C- grade or lower).
NOTE: If the proposed course has not been previously offered as a topics or experimental course, **explain in the attached rationale statement** why the course should be adopted even though it has not been tried out.	

REQUIRED ATTACHMENTS:

1. **Rationale Statement** – Why is this course needed? What purposes will it serve?
2. **Credit Hour Justification** (if required) – explain how this course will comply with the UMW Credit Hours Policy (D.5.3)
3. **Impact Statement** – Provide details about the Library, space, staffing, budget, and technology impacts created by adding this new course. Include supporting statements from the Library, IT Department, etc. ***Any change that impacts another Department must have a written statement (such as an email) from the Chair(s) agreeing to the change.***
4. **Sample Syllabus**

Department Chair Approval*: _____ **Date:** 11/1/2018

CCC Chair Approval: _____ **Date:** _____

***COB and COE proposals approved by the Associate Dean. *BEFORE* consideration by the UCC, the proposal must**

be approved the two levels noted above. Approval by the UCC and UFC are noted on the proposal "status history" at the UCC web site.

Rationale Statement

The proposed course is one part of a package of proposed changes to update and modernize the core of the Business Administration undergraduate degree program. These changes are intended to significantly enhance students training in analytics methodology and are in response to the increased demand for analytical skills in today's highly digital environment. Both the COB Advisory Board as well as AACSB have emphasized the need for much deeper training in analytics as part of the core business degree requirements.

The proposed course is intended to replace our existing DSCI 259 (Applied Statistics and Research Methods) course. DSCI 259 emphasizes traditional empirical research methodology, a skill which has application primarily for those interested in graduate study. While students develop some skill in statistical analysis, it is within a narrow context of empirical research and insufficient for many analytical tasks students will encounter in the workplace. The proposed course will fill this gap by significantly expanding the mathematical techniques, software, and applications that students will learn. The course will focus on one of the most important and widely sought-after areas of analytics: predictive modeling. Students will learn the fundamentals of data visualization as well as statistical and machine learning-based techniques for predictive analysis.

Impact Statement

Since the propose course is intended to replace an existing course in the curricula, no increases in staff or space are needed. The course will use only common (e.g. spreadsheets) and/or open-source software and will not impose any significant technology impacts. There is no expected impact on the library.

DSCI 352 – Analytics I: Predictive Models

Instructor: Christopher J. Garcia, Ph.D.
Office: Woodard 228
Telephone: (540) 654-1456
Email: cgarcia@umw.edu

Office hours: MW 3:00 pm-5:00 p.m., F 4:00-5:00 p.m. and by appointment
Prerequisite: STAT 180 or equivalent

Course Description:
In this course we will be introduced to one of the most important areas in modern analytics: predictive modeling. These techniques enable us to do some amazing things, such as predict home sale prices with great accuracy (Zillow), predict whether a customer will switch to a competitor over the next year, identify and characterize different customer segments from purchasing data, intelligently recommend products (Amazon, Netflix, and others), predict how a political advertisement will impact someone's likelihood to vote for a candidate, and many others. The course will begin with core inferential statistical methods and visualization as a foundation, and then proceed to cover regression, classification, clustering, and time-series models.

Learning Outcomes:
1) Students are proficient in fundamental inferential statistical theory
2) Students are able to apply visualization methods for both initial exploration as well as generating narratives around data
3) Students are proficient in applying essential predictive techniques for exploring, predicting, classifying, and finding trends and insights in data

Text: *R for Business Analytics* by A. Ohri

Required Software:
Microsoft Word and Excel (or equivalent)
R Statistical Package – Base Package (freely downloadable at http://www.r-project.org/)
R Studio (freely downloadable at http://www.rstudio.com/)
Optional: Notepad++ (Windows - Free at http://notepad-plus-plus.org/) or Text Wrangler (Mac – Free at http://www.barebones.com/products/textwrangler/)

Accounts Needed: (all free - we'll go over how to set these up when needed)
GitHub (https://github.com/) (Required)
Shiny (http://www.shinyapps.io/) (Required)
RPubs (https://rpubs.com/) (Required)
Amazon Web Services (https://aws.amazon.com) (Optional)

Grading and Assigned Work:
Assignments (60%), Final Project (30%), Mini-Assignments & Class Participation (10%)

For final grades a total grade of 93.34 and above receives an "A", 90.00 to 93.33 is an "A-", 87.34 to 89.99 is a "B+", 83.34 to 87.33 is a "B", 80.00 to 83.33 is a "B-", 77.34 to 79.99 is a "C+", 73.34 to 77.33 is a "C", 70.00 to 73.33 is a "C-", 67.34 to 69.99 is a "D+", 60.00 to 67.33 is a "D", Below 60 is an "F". For Pass/Fail grading, a grade equivalent to a C- or higher is required to pass.

Attendance and Late Work:
Class attendance is necessary to succeed in this course. It is the student's responsibility to stay current on class material. Late work will be penalized by one-half letter grade per day late unless prior arrangements are made with the instructor.

Academic Integrity:
The University of Mary Washington does not tolerate academic dishonesty in any form. Penalties for cheating on exams or any other assignments in this course may include course failure and suspension or expulsion from the university. It is understood that all material submitted will be in accordance with the Honor Code of UMW.

Disability Accommodations:
Accommodations will be made as needed as coordinated through the Office of Disability Resources.

Tentative Schedule: [**Note – schedule (especially assignments and related dates) likely to change based on our pace]

Week	Start Date	Segment	Topics	Assignments
1	1/12/2015	Ramp-up on Fundamentals	Introduction to business analytics, Inferential statistics part 1	
2	1/19/2015		Inferential statistics part 2	
3	1/26/2015		Inferential statistics part 3	
4	2/2/2015	Intro to R	Intro to R, programming concept basics	Assignment 1: (statistics exam)
5	2/9/2015	Data Visualization	Visualization methods part 1	
6	2/16/2015		Visualization methods part 2	
7	2/23/2015	Regression Models	Intro to regression methods, univariate and multivariate linear regression, interpretation of regression parameters	Assignment 2: Visualization
8	2/27/2015		Spring Break	
9	3/9/2015		Variable selection methods, Polynomial regression and curve-fitting, logistic regression	
10	3/16/2015	Classification Models	Intro to machine learning and classification; Naïve Bayes, and decision tree methods	Assignment 3: Regression
11	3/23/2015		Support vector machines, random forests, and gradient-boosted models	
12	3/30/2015	Clustering Models	Hierarchical, k-means, and model-based clustering methods	
13	4/6/2015	Time Series Models	Time series analysis part 1	Assignment 4: Classification
14	4/13/2015		Time series analysis part 2	
15	4/20/2015		Course Project Help, Catch Up	Assignment 5: Clustering and Time Series
16	4/27/2015		Final Exam Week	Final Project Demos