WINONA STATE UNIVERSITY
NEW AND REVISED COURSE AND PROGRAM APPROVAL FORM

Routing form for new and revised courses and programs.   Course or Program_DSCI 210 – Data Science_____
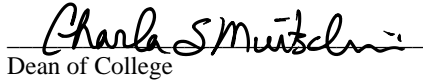

Department Recommendation

_____   _1/24/14_   _bdeppa@winona.edu_
Department Chair   Date   e-mail address

Dean's Recommendation __✓_ Yes   _____ No*

Charla S Mutschler   _1/29/14_
Dean of College   Date

*The dean shall forward their recommendation to the chair of the department, the chair of A2C2, and the Vice President for Academic Affairs.

A2C2 Recommendation   _____ Approved   _____ Disapproved

_____   _____
Chair of A2C2   Date

Graduate Council Recommendation _____ Approved   _____ Disapproved
(if applicable)

_____   _____
Chair of Graduate Council   Date

_____   _____
Director of Graduate Studies   Date

Faculty Senate Recommendation   _____ Approved   _____ Disapproved

_____   _____
President of Faculty Senate   Date

Academic Vice President Recommendation   _____ Approved   _____ Disapproved

_____   _____
Academic Vice President   Date

Decision of President_____ Approved   _____ Disapproved

_____   _____
President   Date

Please forward to Registrar.

Registrar _____ Please notify department chair via e-mail that curricular change has been recorded.
                    Date entered

[Revised 9-1-10]

WINONA STATE UNIVERSITY
PROPOSAL FOR A NEW COURSE

This form is to be used to submit a proposal for a new undergraduate or graduate course. Every item on this form must be completed prior to submission to A2C2. The department proposing a new course must include a *Financial and Staffing Data Sheet* and a *New and Revised Course and Program Approval Form* with the department chairperson's and Dean's signatures. Refer to Regulation 3-4, *Policy for Changing the Curriculum*, for complete information on submitting proposals for curricular changes.

Department <u>Department of Mathematics and Statistics</u>   Date <u>January 20, 2014</u>

<u>DSCI 210</u>   <u>Data Science</u>   __3___
Course No.   Course Title   Credits*

This proposal is for a(n):   ___X___ Undergraduate Course   _____ Graduate Course

Is this course for USP? ____Yes** __X_ No   Is this course for GEP? ____Yes** _X__ No

List all Major Codes to which this proposal applies as a required course: DSCI, STAT

List all Major Codes to which this proposal applies as an elective course:

List all Minor Codes to which this proposal applies as a required course: DSCI

List all Minor Codes to which this proposal applies as an elective course: STAT

Prerequisites   <u>CS 101</u>_____

Grading method _____ Grade only   _____ P/NC only   ___X__ Grade and P/NC Option

Frequency of offering <u>Yearly</u>

What semester do you anticipate that will this course be offered for the first time? _Spring 2015_____
Note: The approval process for a new course typically takes at least four to six weeks

* If this course will change the number of credits for any major or minor, the form *Proposal for a Revised Program* must also be submitted and approved according to the instructions on that form.

**For General Education Program (GEP) or University Studies (USP) course approval, the form *Proposal for General Education Courses* or *Proposal for University Studies Courses* must also be completed and submitted according to the instructions on that form.

Please provide all of the following information:
(Note: a syllabus or other documentation may not substitute for this)

A. Course Description

  1. Description of the course as it will appear in the WSU catalog, including the credit hours, any prerequisites, and the grading method. If the course can be repeated, indicate the maximum number of credit hours for which this can be done.

    DSCI 210 – Data Science (3 S. H.)
    An introduction to methods and techniques commonly used in data science. The management, preparation, analysis, visualization, and modeling of data will be discussed in this class. Students will complete a data science project. Prerequisites: CS 101 – Exploring Creative Computing or permission of instructor. Offered yearly.

2. Course outline of the major topics, themes, subtopics, etc., to be covered in the course. This outline should be, at a minimum, a two-level outline, i.e., consisting of topics and subtopics. This information will be submitted to MnSCU by the WSU Registrar's office.

1. Introduction to Data
   a. Size and scope of data
   b. Data Storage and Warehousing
   c. Data Formats (e.g. time-series, shape files, etc.)
   d. Structured versus unstructured data
2. Introduction to the Data Science Process
   a. Formulating research questions
   b. Assembly of appropriate data
   c. Analysis and Reporting
   d. Repeating the process
3. Management and Preparation of Data
   a. Data integrity and quality
   b. Recoding / creating new variables
   c. Sub-setting, filtering, and collapsing data
4. Analysis and Visualization of Data
   a. Methods to summarize data
   b. Methods to visualize data
   c. Additional summary and visualization methods (e.g., aggregation, conditioning, etc.)
5. Introduction to modeling with data
   a. Introduction to regression problems
   b. Introduction to classification problems
6. Data Science Project

3.a Instructional delivery methods utilized: (Please check all that apply).

Auditorium/Classroom:	ITV	Online	Web Enhanced	X Web Supplemented
Laboratory:	Service Learning	Travel Study	Internship/Practicum	
Other: (Please indicate)				

3.b. MnSCU Course media codes: (Please check all that apply).

None:	3. Internet	6. Independent Study	9. Web Enhanced
1. Satellite	4. ITV Sending	7. Taped	10. Web Supplemented X
2. CD Rom	5. Broadcast TV	8. ITV Receiving	

4. Course requirements (papers, lab work, projects, etc.) and means of evaluation.

The method of instruction for the course will include lecture through the use of several case studies. The course will require substantial student-to-student interaction in order to complete the in-class activities and homework/lab assignments. All assessment should promote and advance a student's problem-solving skills.

Assessments will vary in style and may include written exams, quizzes, homework/lab assignments, and group projects. A student must participate in classroom discussions and complete a substantial data science project for this course.

5. Course materials (textbook(s), articles, etc.).

Possible curriculum resources include:

1. Schutt, R. and O'Neil, C. (2014). Doing Data Science. O'Reilly Media. ISBN: 978-1-449-35865-5
2. Foreman, John. (2014). Data Smart. John Wiley & Sons. ISBN: 978-1-118-66146-8
3. Loukides, Mike (2013). What is Data Science? O'Reilly Media. ISBN: 978-1-449-32755-2
4. Stanton, Jeffrey, (2012). An Introduction to Data Science. Online: http://jsresearch.net/groups/teachdatascience. License information via CC 3.0: http://creativecommons.org/licenses/by-nc-sa/3.0/
5. Nielsen, L. (2012). A Simple Introduction to Data Science. ISBN: 978-0-615-72499-7

6. List the student learning outcomes for this course and how each outcome will be assessed.

Learning Outcomes	Methods of Assessment
Students will be able to identify and describe the methods and techniques commonly used in data science.	• Reflection on pertinent reading assignments • Weekly assignments and quizzes • Exams to include content similar to the INFORMS® data analytics certification exams
Students will be able to apply the data science process to a data science problem.	• Weekly assignments • Data science project
Students will be able to extract and assemble data from a variety of sources.	• Weekly assignments • Data science project
Students will be able to demonstrate the ability to clean and prepare data for an analysis.	• Weekly assignments • Data science project
Students will be able to conduct basic analyses and provide visualizations of data using commonly used tools in data science.	• Weekly assignments • Data science project
Students will conduct a data science project which will require the formulation of the problem, collection and assembly of appropriate data, a thorough analysis of the data, and a proposed solution that can be defended to both a technical (e.g., data scientists) and a non-technical (e.g., executive) audience.	• Data science project

B. Rationale

Provide a rationale for the new course. The rationale should include the following items.

1. A statement of the major focus of the course.

The focus of this course is to expose students to the methods and techniques necessary to work with data in the 21st century. The ability to collect and distribute data is becoming easier, and each day more and more information is being gathered. There is a growing expectation that people will use this information to make more informed decisions. This course will provide a foundation for learning how to transform data into usable information.

2. A statement of how this course will contribute to the departmental curriculum.

This course will be a student's first course in data science. The curriculum in this course will provide a foundation for several other courses in our curriculum.

3. A statement of why this course is to be offered at this level (i.e. 100-, 200-, 300-, 400-, or 500-level)

In our existing curriculum (e.g., STAT and MATH), the 200-level designates foundation-type courses. Also, CS 101 is a required prerequisite of this course.

4. Identification of any courses which may be dropped, if any, if this course is implemented.

None.

C. Impact of This Course on Other Departments, Programs, Majors, and Minors
Provide a statement of the impact of this course on other departments, programs, majors, and minors.

    1. Clearly state the impact of this course on courses taught in other departments. Does this course duplicate the content of any other course? Is there any effect on prerequisites for this or any other courses?

        The curriculum contained in this course creates a bridge between the disciplines of statistics and computer science. Our group has worked closely with computer science to ensure the content in this course is not duplicated in their curriculum.

        This course will likely be a prerequisite for other upper-division data science and upper-division statistics courses within our Department. The courses affected by this change will be revised to reflect this change. To our knowledge, other majors/minors do not regularly take these affected upper-division courses.

    2. Would approval of this course change the total number of credits required by any major or minor of any department? If so, explain the effects which this course would have.

        Yes. This course is part of our new data science major and minor. This course will also be required for our existing statistics degree which will increase the number of credits in that major by 3.

    3. If this course has an impact on the major or minor of any other department or program, it is the responsibility of the department submitting the course proposal to send written notification to the department(s) or program(s) affected. State clearly which other programs are affected by this proposal and whether the other departments have been notified and/or consulted. Attach letter(s) of understanding from impacted department(s).

        The content of this course and the greater data science curriculum was developed in consultation with the computer science department. To our knowledge, no existing curriculum will be adversely impacted by the creation of this course.

D. Attach to This Proposal a Completed
    1. *Financial and Staffing Data Sheet*
    2. *New and Revised Course and Program Approval Form*

E. Department Contact Person for this Proposal:

__Christopher Malone_____   _457-2989_____   ____cmalone@winona.edu_____
Name (please print)   Phone   e-mail address

F. Review by Department A2C2 Representative

I have reviewed this proposal and certify that it is complete _____*Visha Hooks*_____
                                                   Signature of A2C2 representative

Definitions for codes in 3a and 3b:
01-Satellite:
02- CD ROM:
03- Internet: Predominately = where all, or nearly all, course activity occurs in an online environment. One to two activities may occur face-to-face in a classroom, with the maximum being two activities.
04 – ITV Sending: a course in which students are in the classroom with the instructor, other students join via interactive television technology from other geographically separate locations
05 – Broadcast TV:
06 – Independent Study: a course in which the teacher develops specialized curriculum for the student(s) based on department guidelines in the University course catalog
07 – Taped: a course in which the teacher records the lessons for playback at a later date
08 – ITV Receiving: a course in which students are not in the classroom with the teacher, other students join via interactive television technology from other geographically separate locations
09 – Web Enhanced- Limited Seat Time: For a course in which students are geographically separate from the teacher and other students for a majority of required activities. However, some on-site attendance is required. The course includes synchronous and/or asynchronous instruction.
10 – Web Supplemented- No Reduced Seat Time: For a course utilizing the web for instructional activities. Use of this code may assist your college/university in tracking courses for "smart classrooms" and/or facility usage.

WINONA STATE UNIVERSITY
FINANCIAL AND STAFFING DATA SHEET

Include a Financial and Staffing Data Sheet with any proposal for a new course, new program, or revised program.

Please answer the following questions completely. Provide supporting data.

1. Would this course or program be taught with existing staff or with new or additional staff? If this course would be taught by adjunct faculty, include a rationale.

    This course will be taught with existing staff. The creation of this course, along with DSCI 310, represents an increase of 6 S.H. above and beyond our current staffing.   As each course will be offered once per year and in different semesters, we should be able to absorb this increase in staffing without hiring new faculty or adjuncts.

2. What impact would approval of this course/program have on current course offerings? Please discuss number of sections of current offerings, dropping of courses, etc.

    The approval of this course, along with DSCI 310, will have minimal impact on current course offerings. This course is new and will not result in the dropping of any other courses. In the short-term, we anticipate offering a single section of this course per year.

3. What effect would approval of this course/program have on the department supplies? Include data to support expenditures for staffing, equipment, supplies, instructional resources, etc.

    None. This course will utilize student issued laptops and possibly tablet devices. The software that is anticipated to be used is open-source.

Present: Joyati Debnath, Brant Deppa (chair), Jeff Draskoci-Johnson, Eric Errthum, Tisha Hooks, April Kerby, Steve Leonhardi, Chris Malone, Mike Markegard, Barry Peratt, Sam Schmidt, Samuel Tsegai, Aaron Wangberg, Nicole Williams, Lee Windsperger

New Business: Note: All of the items below were considered after the department waived the 40-hour rule without objection.

Motions from the Statistics Subgroup
1. STAT 100 – new course proposal and GEP proposal
      The new STAT 100 course proposal and GEP proposal were approved without objection.

2. New program: B.S. Data Science (DSCI) major, minor, and courses
(i) The department approved two versions of the major, both without objection. The Math department indicated a preference for Version 2, but voted to accept Version 1 if Computer Science preferred that one. Chris was directed to submit whichever one Computer Science preferred. (Their discussion was still pending as of our meeting.)
(ii) The minor was approved without objection, also with the understanding that Computer Science might want to edit certain courses in the elective list.
(iii) All new courses associated with the proposed data science major were approved without objection. These include DSCI 210, DSCI 310, DSCI 395, DSCI 488, DSCI 492, and DSCI 495.
(iv) The notifications for the conversion of STAT 325 to DSCI 325 and STAT 425 to DSCI 425 were approved without objection.

3. Program revisions: B.S. Statistics (STAT) major, minor, and courses
   (i) All revisions, both to the major and to the minor were approved without objection.
   (ii) STAT 395 and STAT 495, i.e. the analogous courses to DSCI 395 and DSCI 495, were approved without objections.

Supporting documentation for items 1 – 3 above were sent to the department by Tisha Hooks (STAT 100) and Chris Malone (DSCI and STAT programs) via e-mail (01/22/14).

4. Notifications re: STAT
The following notifications seek Departmental approval. 1) In Spring, 2013, the department voted to make STAT 310 the prerequisite for a number of upper-division STAT courses. Either this paperwork was not submitted, or got lost. 2) The note in the course description for STAT 305 was corrected to read STAT 305 instead of Math 305. 3) A notification to edit course description slightly and to allow ECON 222 to serve as a possible prerequisite for STAT 310. 4) Include DSCI 210 as a prerequisite for STAT 370.
      The department approved the submission/resubmission of all of these notifications.

5. Notifications re: MATH courses
The following notifications were submitted for departmental approval. (i) A change in course title for MATH 112 from "Modeling with Functions" to "Applied Precalculus" (ii) A change in the catalog description of MATH 112. (See the catalog language at the end of these minutes.) (iii) A change in number for MATH 140 to MATH 132 AND a change in prerequisites from "MATH 112 - Modeling with Functions, MATH 115 - College Algebra, or MATH 120 - Precalculus" to "MATH 112 – Applied Precalculus, MATH 115 - College Algebra, or MATH 120 - Precalculus" (iv) A change in the catalog description of MATH 132. (See the catalog language at the end of these minutes.)
      The department approved all of these changes without objection.

6. Proposal re: MATH 117 from Steve, Barry, and Jeff
      The department approved without objection the proposal to submit MATH 117 as a new course and also the proposal to submit it as a GEP course under Goal 4. Since the Math Subgroup had not had a chance to vote on the committee's work, the department waived normal procedures without objection. (The documents were handed out in the meeting.)

Secretary's note: If there is any confusion at to what, exactly, the department agreed to in Items 1-6 above, I can supply copies of the A2C2 paperwork upon request. Summaries of the proposals re: data science and statistics are attached below.

7. Adjourn
      We adjourned about 12:50 p.m.
                                             Respectfully submitted,
                                             Jeff Draskoci-Johnson