WINONA STATE UNIVERSITY
NEW AND REVISED COURSE AND PROGRAM APPROVAL FORM

Routing form for new and revised courses and programs.   Course or Program **Statistics (STAT) – BS Major**

Department Recommendation

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

Dean's Recommendation _✓_ Yes   _____ No*

Charla S Mintzlin-   _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
FINANCIAL AND STAFFING DATA SHEET

Course or Program **Statistics (STAT) – BS Major**

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.

    The new courses proposed in this revised program will be taught with existing staff.

    STAT 395 and STAT 495 are new courses and initially we anticipate enrollments to be similar to the number of statistics graduates annually (8 – 10). For this reason, these courses will be offered at the same time and location as DSCI 395: Professional Skill Development for Data Science and DSCI 495: Communication of Capstone Outcomes.

    DSCI 325 and DSCI 425 have been offered regularly in our current program as STAT 325 and STAT 425, so no additional staff will be needed.

    The addition of DSCI 210 and DSCI 310 to the revised statistics program was addressed in the financial and staffing data sheet for the new program in Data Science: *DSCI 210 and DSCI 310 represent an increase of 6 S.H. above and beyond our current staffing in the Department of Mathematics & Statistics. 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 proposed revisions will have no major impact on current course offerings. The proposed new courses will be offered regularly as part of the Data Science program.

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.

    There will be no impact on department supplies.

[Revised 9-05]

WINONA STATE UNIVERSITY
PROPOSAL FOR A REVISED PROGRAM

This form is to be used to submit a proposal for a revised undergraduate or graduate major, minor, concentration, or option. Every item on this form must be completed prior to submission to A2C2 for the proposal to be considered for approval. The department proposing a new program must include a *Financial and Staffing Data Sheet* **and the** *New and Revised Course and Program Approval Form* **with 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

<u>Note</u>: Regulation 3-4, *Policy for Changing the Curriculum,* allows a department, with its dean's approval, to change up to two courses per year within an existing major, minor, concentration, option, etc., without seeking review of A2C2 and/or graduate Council, provided that (1) the total credits do not increase or decrease for the major, minor, concentration, option, etc., and (2) the change does not affect other departments or the University Studies or General Education Programs. Please use the *Notification form* for these changes instead of this *Proposal for a Revised Program.*

Department: **<u>Mathematics and Statistics</u>**

Title of Program: **<u>Statistics (STAT) – BS Major</u>**

This is a revised   **X** Major   _____ Minor   _____ Concentration   _____ Option   _____ Other
                                                                                                                                            (explain)
Major/Minor Code of this program: **<u>STAT</u>**

Total Semester Hours **<u>62</u>**

<u>Please provide all of the following information:</u>
 (Note: Other documentation may not substitute for this. All information must be on this form)

A.   **A statement of major focus and objectives of the revised program**   (Include this even if it has not changed)

   The BS Program in Statistics provides students with instruction in the basic techniques, applications, and theories of mathematics and statistics.

B.   **New Catalog Content**   (Include these even if they have not changed)
   1. Provide a list of program content as it would appear in the catalog including required courses, electives, etc., by number and name. Include the number and name for each prerequisite, and all prerequisites of proposed prerequisites. All such prerequisites should be included in the total credit hour calculations for the revised program.
   2. New catalog narrative, if any.

   BS MAJOR - STATISTICS (STAT)
   62 S.H. (No Minor Required)

   The BS Program in Statistics provides students with instruction in the basic techniques, applications, and theories of mathematics and statistics. Students choosing statistics may complete a statistics project under the supervision of a faculty member. This provides students the opportunity to work with a faculty member on a consulting project or research problem. For students planning to attend graduate school, the research project is recommended. Internship opportunities also exist for students in the statistics major. Recent graduates have completed internships at the Mayo Clinic, insurance companies, local industry, and non-profit organizations. Both consulting projects and internships are good choices for students seeking employment upon graduation. Students who are interested in business or industrial applications of statistics might consider the fields of actuarial science or quality control. Specific information about these two fields follows the required coursework for the statistics major.

   DEPARTMENTAL CORE (23 S.H.)

   Techniques of Continuous Mathematics
    MATH 212 - Calculus I (4)
    MATH 213 - Calculus II (4)
    MATH 312 - Multivariable Calculus (4)

Introduction to Theoretical and Discrete Mathematics
  MATH 242 - Linear Algebra (4)
  MATH 327 - Foundations of Mathematics (4)

Statistics
Choose one:
  STAT 210 - Statistics (3)
  STAT 303 - Introduction to Engineering Statistics (3)
  STAT 305 - Biometry (3)

REQUIRED COURSES (27 S.H.)

Mathematics
  MATH 337 Probability (3)

Data Science
  DSCI 210 Data Science (3)
  DSCI 325 Management of Structured Data (3) OR a CS course numbered 234 or above

Statistics
  STAT 310 Intermediate Statistics (3)
  STAT 360 Regression Analysis (3)
  STAT 365 Experimental Design and Analysis (3)
  STAT 450 Introduction to Mathematical Statistics I (3)
  STAT 460 Introduction to Mathematical Statistics II (3)

Capstone Experience – (minimum of 3 S.H.)
  STAT 488 Statistics Projects (1-6) OR
  STAT 492 Practicum in Statistics (3-6)

For each capstone experience, a project proposal must be developed in consultation with a faculty member. A written report is required for satisfactory completion of the capstone experience. The written report must summarize the work completed for the course. Students are expected to submit a poster and/or give an oral presentation at a forum approved by the designated faculty member.

ELECTIVES (12 S.H.)

In consultation with an advisor, students should choose 12 semester hours from STAT courses numbered 320 and above, DSCI 310 or 425, CS courses numbered 234 and above, MATH courses numbered 302 and above, or FIN 335. Students may also choose other classes with a significant mathematical/statistical component offered outside the department; however, the courses must be approved by the Department of Mathematics and Statistics. At least 6 semester hours must be chosen from STAT courses.

Actuarial Science
To become a certified actuary, candidates must pass a series of examinations that are administered by the Society of Actuaries (SOA). Some of the examinations can be successfully completed while the student is still in college. In fact, some companies hire only candidates who have successfully completed at least one of the examinations. WSU offers the following courses that will prepare students for the first exam on Probability (SOA Exam P1).
  - MATH 212, 213, 312, and 337
  - STAT 210 and 450

Actuaries are also required to be certified in three key subject areas through their college coursework that are not covered on the SOA examinations. This certification is called Validation through Educational Experience (VEE). Subject areas and courses for VEE certification are listed below.
  - VEE Economics
      ECON 201 Principles of Microeconomics (3)
      ECON 202 Principles of Macroeconomics (3)
  - VEE Applied Statistical Methods
      STAT 360 Regression Analysis (3)
      FIN 335 Forecasting Methods (3)
  - VEE Corporate Finance
      FIN 360 Corporate Finance (3)

FIN 377 Investments (3)

Quality Assessment and Improvement
Mathematics/Statistics majors who are interested in the area of quality assessment and improvement should consider preparing themselves for the ASQ (American Society for Quality) certification examinations. These examinations are nationally recognized and greatly enhance employment opportunities. The Department of Mathematics and Statistics offers the following courses to help students prepare for certification examinations:

Quality Inspector: STAT 110 or 210 or 303, STAT 320

Quality Technician: STAT 110 or 210 or 303, STAT 320

Quality Auditor: STAT 110 or 210 or 303, STAT 320

Software Quality Engineer: STAT 110 or 210 or 303, STAT 320

Quality Improvement Associate: STAT 110 or 210 or 303, STAT 320, STAT 321

Quality Engineer: STAT 110 or 210 or 303, STAT 320-321

Six Sigma Black Belt/Green Belt: STAT 110 or 210 or 303, STAT 320-321

Manager of Quality/ Organizational Excellence: STAT 110 or 210 or 303, STAT 320, STAT 350

Reliability Engineer: MATH 140 or 212, STAT 210 or 303, STAT 320-321

Biostatistics
Students interested in biostatistics are advised to take courses in biology, computer science, health sciences, and statistics, such as:
- **BIOL 310 Genetics**
- **HERS 403 Epidemiology**
- **CS 368 Introduction to Bioinformatics**
- **STAT 405 Biostatistics**

C. **Description of Revisions**
   1. Provide both the current and the revised program requirements.
      Place these in two columns, side by side with categories aligned, for easy comparison and a clear identification of each change.

   Changes are highlighted in yellow.

Current Major	New Major
BS MAJOR - STATISTICS (STAT)	**BS MAJOR - STATISTICS (STAT)**
59 **S.H.** (No Minor Required)	62 **S.H.** (No Minor Required)
The BS Program in Statistics provides students with instruction in the basic techniques, applications, and theories of mathematics and statistics. Students choosing statistics may complete a statistics project under the supervision of a faculty member. This provides students the opportunity to work with a faculty member on a consulting project or research problem. For students planning to attend graduate school, the research project is recommended. Internship opportunities also exist for students in the statistics major. Recent graduates have completed internships at the Mayo Clinic, insurance companies, local industry, and non-profit organizations. Both consulting projects and internships are good choices for students seeking employment upon graduation.	The BS Program in Statistics provides students with instruction in the basic techniques, applications, and theories of mathematics and statistics. Students choosing statistics may complete a statistics project under the supervision of a faculty member. This provides students the opportunity to work with a faculty member on a consulting project or research problem. For students planning to attend graduate school, the research project is recommended. Internship opportunities also exist for students in the statistics major. Recent graduates have completed internships at the Mayo Clinic, insurance companies, local industry, and non-profit organizations. Both consulting projects and internships are good choices for students seeking employment upon graduation.
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actuarial science or quality control. Specific information about these two fields follows the required coursework for the statistics major.	industrial applications of statistics might consider the fields of actuarial science or quality control. Specific information about these two fields follows the required coursework for the statistics major.
DEPARTMENTAL CORE (23 S.H.)	DEPARTMENTAL CORE (23 S.H.)
Techniques of Continuous Mathematics MATH 212 - Calculus I (4) MATH 213 - Calculus II (4) MATH 312 - Multivariable Calculus (4)	Techniques of Continuous Mathematics MATH 212 - Calculus I (4) MATH 213 - Calculus II (4) MATH 312 - Multivariable Calculus (4)
Introduction to Theoretical and Discrete Mathematics MATH 242 - Linear Algebra (4) MATH 327 - Foundations of Mathematics (4)	Introduction to Theoretical and Discrete Mathematics MATH 242 - Linear Algebra (4) MATH 327 - Foundations of Mathematics (4)
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REQUIRED COURSES (24 S.H.) Mathematics MATH 337 Probability (3)	REQUIRED COURSES (27 S.H.) Mathematics MATH 337 Probability (3)
	Data Science DSCI 210 Data Science (3) DSCI 325 Management of Structured Data (3) OR a CS course numbered 234 or above
Statistics STAT 310 Intermediate Statistics (3) STAT 325 Data Management (3) OR a CS course numbered 234 or above STAT 360 Regression Analysis (3) STAT 365 Experimental Design and Analysis (3) STAT 450 Introduction to Mathematical Statistics I (3) STAT 460 Introduction to Mathematical Statistics II (3)	Statistics STAT 310 Intermediate Statistics (3) STAT 360 Regression Analysis (3) STAT 365 Experimental Design and Analysis (3) STAT 450 Introduction to Mathematical Statistics I (3) STAT 460 Introduction to Mathematical Statistics II (3)
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Left column:

ELECTIVES (12 S.H.)

~~In consultation with an advisor, students should choose 12 semester hours from MATH courses numbered 302 and above, STAT courses numbered 320 and above, CS courses numbered 234 and above, or FIN 335.~~ Students may also choose other classes with a significant mathematical/statistical component offered outside the department; however, the courses must be approved by the Department of Mathematics and Statistics. At least 6 semester hours must be chosen from STAT courses.

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• VEE Economics
  ECON 201 Principles of Microeconomics (3)
  ECON 202 Principles of Macroeconomics (3)
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  FIN 335 Forecasting Methods (3)
• VEE Corporate Finance
  FIN 360 Corporate Finance (3)
  FIN 377 Investments (3)

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Right column:

ELECTIVES (12 S.H.)

In consultation with an advisor, students should choose 12 semester hours from STAT courses numbered 320 and above, DSCI 310 or 425, CS courses numbered 234 and above, MATH courses numbered 302 and above, or FIN 335. Students may also choose other classes with a significant mathematical/statistical component offered outside the department; however, the courses must be approved by the Department of Mathematics and Statistics. At least 6 semester hours must be chosen from STAT courses.

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  FIN 360 Corporate Finance (3)
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Software Quality Engineer: STAT 110 or 210 or 303, STAT 320 Quality Improvement Associate: STAT 110 or 210 or 303, STAT 320, STAT 321 Quality Engineer: STAT 110 or 210 or 303, STAT 320-321 Six Sigma Black Belt/Green Belt: STAT 110 or 210 or 303, STAT 320-321 Manager of Quality/ Organizational Excellence: STAT 110 or 210 or 303, STAT 320, STAT 350 Reliability Engineer: MATH 140 or 212, STAT 210 or 303, STAT 320-321 Biostatistics Students interested in biostatistics are advised to take courses in biology, computer science, health sciences, and statistics, such as: BIOL 310 Genetics HERS 403 Epidemiology CS 368 Introduction to Bioinformatics STAT 405 Biostatistics	Software Quality Engineer: STAT 110 or 210 or 303, STAT 320 Quality Improvement Associate: STAT 110 or 210 or 303, STAT 320, STAT 321 Quality Engineer: STAT 110 or 210 or 303, STAT 320-321 Six Sigma Black Belt/Green Belt: STAT 110 or 210 or 303, STAT 320-321 Manager of Quality/ Organizational Excellence: STAT 110 or 210 or 303, STAT 320, STAT 350 Reliability Engineer: MATH 140 or 212, STAT 210 or 303, STAT 320-321 Biostatistics Students interested in biostatistics are advised to take courses in biology, computer science, health sciences, and statistics, such as: BIOL 310 Genetics HERS 403 Epidemiology CS 368 Introduction to Bioinformatics STAT 405 Biostatistics

2. For each required and elective course being added to the program, provide the course number, name, catalog description, and a brief statement explaining why the course should be included in the program.

STAT 395 – Professional Skill Development for Statistics (2 S.H.)
This course will develop skills necessary to become a working professional in the field of statistics. Students will critique, analyze, and evaluate several statistics research projects. A student's presentation, writing, and professional skills will be enhanced in this course. Prerequisites: Competition of GEP GOAL 1 requirements, STAT 360 or STAT 365, or permission of instructor. Grade and P/NC option. Offered yearly.

STAT 395 is being added as an elective course for the statistics major. This course will prepare students to complete their capstone requirement for the statistics degree. In addition, students will learn the skills necessary for seeking employment.

STAT 495 – Communication of Capstone Outcomes (1 S. H.)
Students will disseminate the outcomes from their statistics capstone project in this course. Students will be required to create a professional poster, create and deliver a professional quality presentation, and write a detailed report of their capstone project outcomes. Prerequisites: STAT 395. Grade and P/NC option. Offered yearly.

STAT 495 is being added as an elective course for the statistics major. This course will create a common set of expectations for the digitalization and dissemination of capstone outcomes.

DSCI 210 – Data Science (3 S. H.)
Introduction to the methods and techniques used in data science. An introduction to the management, preparation, analysis, visualization, and modeling of data will be discussed in this class. Students will complete a data science project. Offered yearly.

DSCI 210 is being added as a required course for the statistics major. This is a new course that has been developed for the Data Science Program, which is a bridge between statistics and computer science. Due to advances in technology, the collection and management of data has changed drastically in recent years, and our current program has not kept up with these changes. In order to sufficiently prepare our students to be statisticians in today's workplace, they must have some basic skills in data science. We feel that this course

will provide these basic skills.

DSCI 310 – Data Summary and Visualization (3 S.H.)
This course focuses on tools and applications that help establish and/or understand relationships between information and data; and how to begin transforming data into visualizations to answer questions of interest. Topics include applying statistics to research data; using software and programming environments to begin the visualization process; making modifications to data sets, data filtering and transforming; using dynamic and interactive graphics; and the creation of dashboards. Prerequisites: DSCI 210 – Data Science or permission of instructor. Offered yearly.

DSCI 310 is being added an elective course for the statistics major. Data visualization techniques have also changed drastically in recent years, and our current program is deficient in this area. A course in data visualization will provide necessary skills to students seeking employment or a graduate degree in statistics.

DSCI 325 – Management of Structured Data (3 S.H.)
This course will give students an overview of the issues related to the management of data. Topics to be covered in this course include: data warehousing, data integrity and quality, data cleansing, basic programming concepts, the construction of simple algorithms, and the appropriate descriptive and graphical summaries of data. Commonly used software packages for the analysis and management of data will be emphasized. Prerequisite: DSCI 210. Offered yearly.
STAT 325 was a required course under the old program. This course has now become DSCI 325 and is still a requirement for the statistics major.

DSCI 425 – Supervised Learning (3 S.H.)
An introduction to machine or statistical learning techniques, covering both supervised and unsupervised methods. Supervised methods for both predicting both numeric and categorical responses will be the focus. Unsupervised learning methods such as clustering, association rules, and dimension reduction methods will be briefly discussed. Prerequisite: DSCI 210 and STAT 360 or permission of instructor. Offered alternate years.

STAT 425 was an elective under the old program. This course has now become DSCI 425 and is still an elective for the statistics major.

D. Impact of this Program Revision
   1. Clearly state the impact of this revised program on other departments, programs, minors, or majors.
   2. It is the responsibility of the department submitting a program proposal to send written notification to the department(s) or program(s) affected. Attach letter(s) of understanding from any impacted department(s).

   These proposed changes will have no impact on other departments, programs, minors, or majors.

E. Attach to this proposal a completed
   1. *Financial and Staffing Data Sheet*
   2. *New and Revised Course and Program Approval Form for this course*
  You may also need to fill out the MNSCU Program Redesign Application and submit this directly to the VPAA.
  This program revision will be implemented in the fall semester following completion of the approval process.

F. Department Contact Person for this Proposal

Christopher Malone	**507-457-2989**	**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

Tisha Hooks
_____
                                           Signature of A2C2 representative

Minutes of the Department Meeting on 1/24/14

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 of all of these notifications.

5. Notifications re: MATH courses
    The department approved all of the notifications proposed by the Math Subgroup. These included changes in course titles, numbers, and catalog descriptions

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