WINONA STATE UNIVERSITY
REQUIRED CHECKLIST FOR ALL CURRICULAR PROPOSALS

Course or Program  MATH 440

This checklist enables A2C2 representatives to endorse that their departments have accurately followed the Process for Accomplishing Curricular Change. For each course or program proposal submitted to A2C2, this checklist must be completed, signed by the submitting department's A2C2 representative, and included with the proposal when forwarded for approval. Peer review of proposals is also strongly advised, e.g., departments should discuss and vote on the proposals as submitted to A2C2, rather than on just the ideas proposed or drafts of proposals.

If a proposal fails to follow or complete any aspect of the process, the Course and Program Proposal Subcommittee will postpone consideration of the proposal and return it to the department's A2C2 representative for completion and resubmission. Resubmitted proposals have the same status as newly submitted proposals.

Note: This form need not be completed for notifications.

1. The appropriate forms and the “Approval Form” have been completed in full for this proposal. All necessary or relevant descriptions, rationales, and notifications have been provided.
   _______ Completed

2a. The “Financial and Staffing Data Sheet” has been completed and is enclosed in this proposal, if applicable.
   _______ Completed  _______ NA

2b. For departments that have claimed that “existing staff” would be teaching the course proposed, an explanation has been enclosed in this proposal as to how existing staff will do this, e.g., what enrollment limits can be accommodated by existing staff. If no such explanation is enclosed, the department's representative is prepared to address A2C2's questions on this matter.
   _______ Completed  _______ NA

3. Arrangements have been made so that a department representative knowledgeable of this proposal will be attending both the Course and Program Proposal Subcommittee meeting and the full A2C2 meeting at which this proposal is considered.
   _______ Completed
   Name and office phone number of proposal's representative: ___________________________________________

4. Reasonable attempts have been made to notify and reach agreements with all university units affected by this proposal. Units still opposing a proposal must submit their objections in writing before or during the Course and Program Proposal Subcommittee meeting at which this proposal is considered.
   _______ Completed  _______ NA

5. The course name and number is listed for each prerequisite involved in this proposal.
   _______ Completed  _______ NA

6. In this proposal for a new or revised program (major, minor, concentration, etc.), the list of prerequisites provided includes all the prerequisites of any proposed prerequisites. All such prerequisites of prerequisites are included in the total credit hour calculations.
   _______ Completed  _______ NA

7. In this proposal for a new or revised program, the following information for each required or elective course is provided:
   a. The course name and number.
   b. A brief course description.
   c. A brief statement explaining why the program should include the course.
   _______ Completed  _______ NA

8. This course or program revision proposal:
   a. Clearly identifies each proposed change.
   _______ Completed  _______ NA

9. This course proposal provides publication dates for all works listed as course textbooks or references using a standard form of citation. Accessibility of the cited publications for use in this proposed course has been confirmed.
   _______ Completed  _______ NA

__________________________________________________  ____________________
Department's A2C2 Representative or Alternate  Date

[Revised 9-05]
Routing form for new and revised courses and programs.

Course or Program _______ MATH 440 _______

<table>
<thead>
<tr>
<th>Department Recommendation</th>
<th></th>
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<tbody>
<tr>
<td>Department Chair</td>
<td>Date</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dean’s Recommendation</th>
<th>Yes</th>
<th>No*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of College</td>
<td></td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>A2C2 Recommendation</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair of A2C2</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Graduate Council Recommendation (if applicable)</th>
<th>Approved</th>
<th>Disapproved</th>
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</thead>
<tbody>
<tr>
<td>Chair of Graduate Council</td>
<td></td>
<td></td>
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<tr>
<td>Director of Graduate Studies</td>
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</table>

<table>
<thead>
<tr>
<th>Faculty Senate Recommendation</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
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<tbody>
<tr>
<td>President of Faculty Senate</td>
<td></td>
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<tr>
<th>Academic Vice President Recommendation</th>
<th>Approved</th>
<th>Disapproved</th>
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<tbody>
<tr>
<td>Academic Vice President</td>
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<table>
<thead>
<tr>
<th>Decision of President</th>
<th>Approved</th>
<th>Disapproved</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td></td>
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</table>

Please forward to Registrar.

<table>
<thead>
<tr>
<th>Registrar</th>
<th>Date entered</th>
<th>Please notify department chair via e-mail that curricular change has been recorded.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date entered</td>
<td></td>
</tr>
</tbody>
</table>
WINONA STATE UNIVERSITY
PROPOSAL FOR REVISED COURSES

Department __Mathematics and Statistics______________ Date _2/11/2011_

If proposed course change requires A2C2 and/or graduate Council approval, i.e., not considered a notification, complete and submit this form with the appropriate number of copies. Refer to Regulation 3-4, Policy for Changing the Curriculum, for complete information on submitting proposals for curricular changes.

Current Course Information

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 440</td>
<td>Abstract Algebra</td>
<td>4</td>
</tr>
</tbody>
</table>

This Proposal is for a(n) 

_____ Undergraduate Course 

_____ Graduate Course 

Applies to: 

_____ Major

_____ Minor

_____ X University Studies

_____ Elective

_____ Not for USP

_____ Elective

Prerequisites _MATH 210__________________________

Grading 

_____ Grade only

_____ P/NC only

_____ Grade and P/NC Option

Frequency of offering 

Each Fall Semester

Proposed Course Information. (Please indicate only proposed changes below.)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abstract Algebra</td>
<td>3</td>
</tr>
</tbody>
</table>

This Proposal is for a(n) 

_____ Undergraduate Course 

_____ Graduate Course 

Applies to 

_____ Major 

_____ Minor

_____ University Studies

_____ Elective

_____ Elective

Prerequisites ____________________________

Grading 

_____ Grade only

_____ P/NC only

_____ Grade and P/NC Option

Frequency of offering ____________________________

A. Changes in the course description. [SEE ATTACHED]

1. Catalog description (include a display of current and proposed course requirements).
2. Course outline of the major topics and subtopics (minimum of two-level outline).
3.a. Instructional delivery methods utilized: (Please check all that apply).

<table>
<thead>
<tr>
<th>Instructional Methods</th>
<th>Web Enhanced</th>
<th>Web Supplemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture: Auditorium</td>
<td>Online</td>
<td>Web Enhanced</td>
</tr>
<tr>
<td>Lecture: Classroom</td>
<td>Service Learning</td>
<td>Laboratory</td>
</tr>
<tr>
<td>Other: (Please indicate)</td>
<td>Internship/Practicum</td>
<td></td>
</tr>
</tbody>
</table>

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

2. CD Rom

5. Broadcast TV

8. ITV Receiving

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

B. Rationale for each of the changes proposed.
C. Impact of this Course on other Departments, Programs, Majors, or Minors

1. Does this course increase or decrease the total credits required by a major or minor of any other department? If so, which department(s)?
2. List the department(s), if any, which have been consulted about this proposal.

D. Describe impacts of this proposal on the University Studies Program.
Definitions:

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.

Attach an Approval Form with appropriate signatures.

Department Contact Person for this Proposal:

Barry Peratt 457-5567 bperatt@winona.edu
Name (please print) Phone e-mail address
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 would be taught by existing faculty.*

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.

   *As described in the proposal, this revised MATH 440 (3 S.H.) course will replace our current MATH 440 (4 S.H.) course.*

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.

   *The demand for these resources would not change.*
A2C2 Proposed Change for MATH 440  
Spring 2011

A. Catalog Changes

<table>
<thead>
<tr>
<th>440 - Abstract Algebra (4 S.H.)</th>
<th>440 - Abstract Algebra I (3 S.H.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axiomatic development of groups, rings, and fields.</td>
<td>Axiomatic development of groups, rings, and fields.</td>
</tr>
<tr>
<td>Prerequisite: MATH 210. Offered fall semester.</td>
<td>Prerequisite: MATH 210. Recommended: MATH 310. Offered every fall semester.</td>
</tr>
</tbody>
</table>

The rest of the information for this section is contained in the attached course outline.

B. Rationale for reducing MATH 440 from 4 credits to 3 credits.

The reason for the reduction is that under our proposed B.S. major and revised B.A. major, a second course in either Advanced Calculus or Abstract Algebra will be required of all of our mathematics majors. The overall content and purpose of the course will not substantially change; we will simply cover fewer topics than under the 4 S.H. course by ending our coverage with rings, vector spaces, and fields.

C. The Impact of This Course on Other Departments, Programs, Majors and Minors

The change in this course as well as a similar change in Advanced Calculus I, MATH 440, and an increase of 1 S.H. in Linear Algebra, MATH 205, will result in a net decrease of 1 credit hour for the Mathematics Education major.

The change will not affect the number of credit hours in the Statistics major or Math minor.

D. The Impact of This Course Change on the University Studies Program

Currently, MATH 440 satisfies a Writing Flag. The material in this course which qualifies it thus (in particular, the careful exposition of mathematical logic and the writing and re-writing of proofs) does not substantially change; it merely comprises fewer credit hours.
Course Title: Abstract Algebra I

Catalog Description: Axiomatic development of groups, rings, and fields.

Number of Credits: 3 S.H.

Text:

- Contemporary Abstract Algebra, 6th edition by Joseph Gallian
- A First Course in Abstract Algebra, 2nd edition by Joseph Rotman
- Abstract Algebra, 3rd Edition by I. N. Herstein
- Abstract Algebra-An Introduction, 2nd edition, by Thomas Hungerford
- Elements of Modern Algebra, 6th edition by Jimmie Gilbert and Linda Gilbert
- A First Course in Abstract Algebra, 6th edition by John B. Fraleigh

Topics Covered:

- Review Well Ordering Principle, Modular Arithmetic, Mathematical Induction, Equivalence Relations, Functions, Direct and Indirect Proof Techniques
- Groups: Introduction, Finite groups, Subgroups, Cyclic Groups, Permutation Groups,
- More on Groups: Isomorphisms, Cosets and Lagrange’s Theorem, Direct Products, Factor Groups and Normal Subgroups, Groups Homomorphisms
- Introduction to Rings and Fields

Listing of Sections in Departmental Text to be Covered (Name and Author of Text Here): No Departmental Text required for this Course

Remarks: Students would always need a review of Discrete Math and Linear Algebra material.

Approximate pace of coverage: 2 weeks on review 4-5 weeks on Groups, 3-4 weeks on Rings about 2 weeks on Fields.

Method of Instruction: Lecture-presentation, discussion, question-answer sessions, use of calculators/computers, group work and/or paper presentations.

Evaluation Procedure: Homework, quizzes, projects, midterm exams, and a final exam and a research article.
The following University Studies language is required to appear on each instructor’s syllabus for the course:

How Abstract Algebra (MATH 440) Satisfies the Detailed Writing Flag Requirements: Writing Flag courses must include requirements and learning activities that promote students’ abilities to:

a. **practice the processes and procedures for creating and completing successful writing in their fields;**

This course is a rigorous introduction to the concepts of Abstract Algebra. To successfully complete the course, the student is required to demonstrate not only an understanding of the mathematical concepts involved in Abstract Algebra, but also an ability to convey those concepts in concise written form, both formally (proof) and informally (abstract). Mathematical proof represents a very precise writing style that has developed over two thousand years, and writing an abstract of a proof requires an understanding of, and an ability to articulate, the methods and strategies used to construct the proof. Proper use of this writing style requires a knowledge of the relevant terminology and a facility with the grammar and sentence structure that is germane to good expository writing. The student receives feedback on his or her written presentation of logical arguments throughout the semester, with the opportunity to refine both the proofs and abstracts.

b. **understand the main features and uses of writing in their fields;**

It is in rigorous courses such as Abstract Algebra that the student’s conceptual understanding of mathematics is expanded into a rigorous understanding of the logical underpinnings of mathematical abstraction. This logical foundation, by its very nature, is inextricably interwoven with the precise writing that is used to express it. It is here that the student gains an awareness that proofs of mathematical theorems and propositions lie not in convincing pictures or clever examples, but in very precise and carefully applied logical analysis. Such analysis is only as clear as its exposition. A proof is not clear unless the reader has a prior organizational structure within which to interpret the proof. An abstract serves the purpose of providing the reader with this necessary tool.

c. **adapt their writing to the general expectations of readers in their fields;**

Writing a mathematical proof is a very different type of writing compared to most other exposition. In this course, the successful student must learn to weave good sentence structure with mathematical formulae and symbolism in a way that brings clarity to the subject of the exposition. Particularly close attention must be paid to the implications of uni- and bi-conditional statements and the differences among theorems, conjectures, lemmas, and definitions. On the other hand, to write an abstract of a proof, the student must have a facility with these ideas that runs deeply enough to allow him/her to accurately present the essence of the thinking behind a proof without becoming excessively technical.
d. **make use of the technologies commonly used for research and writing in their fields;**
   When attempting to uncover patterns in analysis and abstraction, the student routinely makes use of various graphical and algebraic computer aids, such as graphing calculators or computer algebra systems. Additionally, there are special scripting languages for typesetting mathematical exposition, such as TeX and LaTeX. Either these or the equation editors in most popular word processors may be used to render proofs in this course. The use of typesetting tools is not a requirement of the course, but instead an option whose implementation is left to the discretion of the instructor.

e. **learn the conventions of evidence, format, usage, and documentation in their fields.**
   As discussed above, the student encounters heavy use of mathematical terminology, mathematical reasoning, and the expository strategies unique to the field of mathematical analysis as well as the conventions for citing previously proven results, such as lemmas or theorems, in a mathematical proof.

Last Revised: February 2011 by the Mathematics Subgroup