**GUIDELINES FOR CURRICULUM CHANGES**

***Curricular revisions should include the following information:***

* CURRENT: If change to major and/or minor, include current requirements as baseline for the committee’s consideration.
* PROPOSED: Detail the changes requested
* RATIONALE (type of questions to consider include):
  + Where do these changes place the program within the field?
  + In what ways did the results of your program assessment plan inform these changes?
  + How do these changes reflect most recent self-study and/or recommendations from outside reviewers?
  + How to the changes fit with Strategic Plan 3?
* Effective implementation date
  + How to accommodate students during transition to new major (if relevant)
* Include [New Course Proposal form](file:///P:\Departments\APSC\shared\New%20Course%20Proposals\newcourseform.doc) for all new courses as part of the major/minor revision.

***Below are examples of types of changes and format:***

**CHANGES TO COURSES:**

**A. Title Change:**  
Include old title, new title and rationale.

Example:

**ANTH 219:**  
**Old Course Title:** Geography of Gender  
**New Course Title:** Gender, Space and Identity

**Rationale:** The new title more accurately describes the course content and is more consistent with the language geographers actually use to talk about the subject matter covered by the course.

**B. Description Change:**  
Include old description, new description and rationale.

Example:

**BIOL 326: Microbiology  
Old Course Description:** The structure, function, and genetics of bacteria and viruses. A special emphasis is placed on the epidemiology and control of infectious human microbial diseases. Laboratory exercises include the characterization and identification of microbes using sterile techniques as well as current molecular methods in microbiology. Six hours classroom a week. Prerequisite: two Biology courses numbered between 120 and 129 or Environmental Studies 131, 132, or a 130-level with lab Environmental Studies course. For Neuroscience majors, prerequisite is Biology 124 and Psychology 125. Offered every other year.

**New Course Description:** Molecular biology, genetics, and biochemistry (structure and function) of bacteria, archaea, and viruses. Includes an introduction to the immune system and mechanisms of medical control of microbes. Molecular mechanisms of bacterial pathogenesis are addressed via readings from the recent primary literature. Laboratory exercises include the isolation and characterization of unknown bacteria using traditional and molecular methods, and modern genomic approaches to characterizing host response to infection. Six hours classroom a week. Prerequisites: two Biology courses numbered between 120 and 129, or Environmental Studies 131 and 132. For Neuroscience majors only, prerequisite is Biology 124 and Psychology 125.

**Rationale:** The current course description does not accurately convey the course content.

**C. Change in course number – level changes, course content and description remains the same:**  
Include old number, new number and rationale.

Example:

**Old course number: HIST 383: Latin American-U.S. Relations  
New course number: HIST 283: Latin American-U.S. Relations**

**Rationale:** Diplomatic courses attract a range of students from different majors (many from IS, IB&M, etc.) and this course is for most the first experience with analyzing different types of historical texts and comparing historical arguments while at the same time it covers a lot of content. Many students have not taken anything dealing with Latin American history or contemporary society either. Changing the numbering to 283 also better fits the department’s clarification of what differentiates a 200-level course from a 300-level course (context driven principally by period or region; emphasis now shifts to explaining how historians use primary sources to reach interpretive judgments; engage students in the thrill of discovery with various types of primary sources).

**D. Previous One-Time only to permanent course offering**  
Complete new course proposal form. Indicate on the form that the course was previously offered as a one-time only offering and rationale for adding it a permanent course offering.

**E. Change in Major:**  
1) Include old and new major requirements, supporting materials, and rationale.

2) Include an assessment plan.

3) If the change includes the dependency upon courses within another department, a letter of support from that department must be included, stating that the course(s) will be offered on a regular basis to accommodate majors.

4) Complete new course proposal forms for any new course offerings for the major revision.

5) Reference how the change relates to the department’s most recent review.

6) If the change includes removal of courses previously required for the major, how will the declared majors under the old requirements be accommodated?

The following is taken from a report to faculty and is the preferred format for submission of requests for major changes to APSC:

**Request that the following changes to the Mathematics program be approved:**

**A. Request the following course be removed from the Bulletin :**

**MATH 152: Introduction to Calculus**

See Rationale with C.1. below.

**B. Request for approval of the following changes to course titles, descriptions, pre-requisites, and numbering:**

**1. MATH 151, 152: Introduction to Calculus**

**Old course description:** First semester: a study of functions and limits with an introduction to derivatives. Second semester: continuation of differential calculus and an introduction to integral calculus with emphasis on applications. As needed, this sequence is augmented with a review of algebra, geometry, etc. Students are strongly encouraged to take both semesters. A two-course sequence designed to prepare students for MATH 162, Calculus II. Course meets in a computer lab five hours per week. Because of course content similarity, students cannot receive credit for both MATH 152 and MATH 161. Prerequisite: departmental placement. 151 is offered every fall; 152 is offered every spring.

**MATH 151: Introduction to Calculus**

**New course description :** An introduction to limits and derivatives together with a review of polynomial, rational, trigonometric, exponential, and logarithmic functions. Five hours of class time per week. Prerequisite: departmental placement. Offered every semester.

**Rationale :** MATH 151-152 was a full-year sequence intended for students with weak pre-calculus skills. The pair of courses covered all the material in Calculus I, some of the material in Calculus II, and reviewed all the necessary pre-calculus. After MATH 152 a student was able to enroll in Calculus II. The courses were taught using the workshop method and were based on Nancy Baxter Hastings' textbook Workshop Calculus , which is now out of print.

We plan on teaching a slightly modified version of MATH 151 using the workshop method. In this course a student will receive a good review of pre-calculus and an introduction to some calculus topics. Such a student will be ready to take (the newly-proposed) MATH 170. Because the students who take MATH 151 have a weak mathematics background, they will benefit from seeing some calculus before taking MATH 170. In fact, the vast majority of the other students in MATH 170 (usually around 90%) have seen some calculus in high school courses.

The timing of MATH 151/152 has always caused trouble for students. It is a full-year sequence starting in the fall semester. It is difficult for many students to fit these courses into their schedule, especially those wanting to study abroad. Moreover, we offer two full sections of MATH 151 each fall and approximately half of the students go on to MATH 152. Some semesters we can offer one section of MATH 152, but often we have to offer two under-full sections. This has required hiring an adjunct to teach the extra section.

In our proposed plan, we will offer one section of MATH 151 in the spring and one section in the fall, and MATH 170 will be offered both semesters; this will give the students a lot of flexibility and we will have fewer under-full sections of these courses.

**2. Old course number, title and description:**

**MATH 161: Calculus I** The study of real-valued functions, limits, derivatives, and their applications, the definition of the Riemann integral, and the Fundamental Theorem of Calculus. Three hours of classroom and two hours of lab per week. Because of course similarity, students cannot receive credit for both 152 and 161. Prerequisite: departmental placement, or 151 with permission of the instructor. Offered every fall.

**New course number, title and description:**

**MATH 170: Single Variable Calculus** The study of real-valued functions, including transcendental functions, limits, derivatives, and their applications, the definition of the Riemann integral, and the Fundamental Theorem of Calculus. Three hours of classroom and one and a half hours of lab per week. Prerequisite: 151 or departmental placement. Offered every semester.

**3. Old course number, title and description:**

**MATH 261: Calculus III** Multivariate calculus including vectors, three-dimensional analytic geometry, vector-valued functions, functions of several variables, partial differentiation, and multiple integration. Additional topics if time permits. Prerequisite: 162 or departmental placement. Offered every spring.

**New course number, title and description:**

**MATH 171: Multivariable Calculus** Multivariable calculus including parametric and polar equations, vectors, three-dimensional analytic geometry, vector-valued functions, functions of several variables, partial derivatives, and multiple integrals. Additional topics if time permits. Three hours classroom and one and a half hours of lab per week. Prerequisite: 170 or departmental placement. Offered every semester.

**4. Old course number, title and description:**

**MATH 162: Calculus III** The study of transcendental functions, methods of integration, and infinite sequences and series. Optional topics include separable differential equations and an introduction to parametric equations. Concepts and applications are emphasized. Three hours classroom and two hours of lab per week. Prerequisite: 152 or 161 or departmental placement. Offered every semester.

**New course number, title and description:**

**MATH 270: Integration and Infinite Series** The study of methods of integration, applications of the integral, elementary differential equations, and infinite sequences and series. Prerequisite: 171 or departmental placement. Offered every spring.

**Rationale (for #2, 3, and 4):** Currently we offer three semesters of calculus: MATH 161, 162, and 261 (Calculus I, II, and III). Students must take the courses in this order. Several majors require two semester of calculus (Chemistry, Physics, Biochemistry and Molecular Biology), other majors or programs require one semester of calculus (Economics, Computer Science, Pre-health), and still others recommend calculus to their students or allow calculus to satisfy their mathematics requirement (Biology, Environmental Science, Neuroscience).

After speaking with members of the departments that require or recommend two semesters of calculus and reading curricular recommendations by the Mathematical Association of America, we discovered that the material in MATH 261 (Calculus III) is more useful to these disciplines than the material in MATH 162 (Calculus II). Moreover, students find the material in Calculus II very challenging. It will be to their benefit to see this in the third semester rather than the second semester of the sequence. By altering the content of these courses a little we are able to change their order. All majors and programs requiring calculus are aware of and support these changes.

Many students come to Dickinson with AP credit in mathematics. The Calculus AB AP exam covers the material in MATH 170 and a little of MATH 270. The Calculus BC AP exam covers the material in MATH 170 and MATH 270. A consequence of this is that students earning a 4 or 5 on the Calculus BC AP exam will get credit for the first and third semester courses and will have to take the second semester course to continue with the mathematics curriculum.

Currently both MATH 161 and MATH 162 have one two-hour lab per week. Under the new curriculum MATH 170 and MATH 171 will have labs. We propose shortening the labs to 1.5 hours per week. We propose this for two reasons. First, we rarely need 2 hours for our labs; shortening the labs to 1.5 hours would not significantly change content or pedagogy. The second reason involves scheduling and space utilization. We can hold our labs in only two classrooms (Tome 120 and 122), and these classrooms are also used for the labs of COMP 131, thus we often have to schedule labs back-to-back in the afternoons. It is impossible to teach back-to-back labs between 1:30 and 4:30, so our labs start at 1:00 and end at 5:00, which conflict with classes and co-curricular programs. If we shortened our labs they would be able to fit into the academic schedule.

Each member of our department teaches 5 courses per year on average . That is, we take a long-term view. For example, a professor may teach 5 1/3 courses one year, then 4 2/3 the next yearwe keep track of lab credits from year to year ensuring that in the long run we are teaching 5 classes per year. Under this new schedule our teaching load goes from 65 1/3 courses every two years to 64 2/3 courses every two years. We have six full-time faculty and we get two adjuncts each year. So we can teach 64 courses every two years. In reality, our adjuncts often teach lab courses, so in reality we can teach more than 64 courses without teaching overloads. If we happened to accumulate too many lab credits, then we won't have to ask the Provost for extra adjuncts (as we often do when our classes are over-requested).

Our department is scheduled to have an outside review during the 2013-14 school year. By then we will have taught under this new scheme for three years. So this will be a perfect opportunity to reflect on the benefits of this new curriculum.

**5. MATH 211: Discrete Mathematics**

**Old Course Prerequisites :** Prerequisite: 161 or COMP 131 or departmental placement. NOTE: Completion of both 211 and 262 fulfills the WR requirement. Offered every fall.

**New Course Prerquisites :** Prerequisite: 170 or COMP 131 or departmental placement. Fulfills the WR requirement. Offered every fall.

**Rationale :** The prerequisites must be changed to reflect the new courses. Also, as of Fall 2009, MATH 211 satisfies the WR requirement.

**6. MATH 225: Probability and Statistics I**

**Old Course Description and Prerequisites:** An introduction to the core ideas of probability and statistics. Topics include discrete and continuous random variables, joint and conditional distributions, expectation, variance, random sampling from populations, hypothesis tests, confidence intervals, and a brief introduction to simple linear regression. Prerequisite: 162. Offered in even numbered fall semesters.

**New Course Description and Prerequisites:** An introduction to the core topics of probability and statistics. Topics include discrete and continuous random variables, joint distributions, expectation, variance, random sampling from populations, hypothesis tests, and confidence intervals. Prerequisite: 171. Offered in even numbered fall semesters.

**Rationale :** The new course description more closely matches the material that is being covered in the course. The prerequisites must be changed to reflect the new courses. MATH 225 has now been taught three times.

**7. MATH 241: Numerical Methods (cross-listed COMP 241)**

**Old Course Prerequisites and offering schedule:** Prerequisite: 211 and knowledge of a programming language. This course is cross-listed as COMP 241. Offered in even numbered spring semesters.

**New Course Prerequisites and offering schedule:** Prerequisite: 171 or 211 or 270 and knowledge of a programming language. This course is cross-listed as COMP 241. Offered in odd numbered fall semesters.

**Rationale :** We require that the students take one course beyond MATH 170 (namely MATH 171, 211, or 270). This ensures a level of mathematical maturity, but gives the students more flexibility than the earlier prerequisite.

**8. MATH 271: Differential Equations**

**Old Course Prerequisites and offering schedule:** Prerequisite: 261. Offered every two years.

**New Course Prerequisites and offering schedule:** Prerequisites: 171 and 270. Offered in even numbered spring semesters.

**Rationale :** The prerequisites must be changed to reflect the new courses.

**9. MATH 325: Probability and Statistics II**

**Old Course Description and Prerequisites:** A continuation of Introduction to Probability and Statistics I. Includes such topics as analysis of variance, multiple and nonlinear regression, goodness of fit tests for categorical data, nonparametric methods, and statistical quality control. Prerequisites: 225 and 261. Offered in odd numbered spring semesters.

**New Course Description and Prerequisites:** A continuation of Introduction to Probability and Statistics I. Topics include additional discrete and continuous distributions, conditional distributions, additional hypothesis tests, simple linear regression and correlation, multiple linear regression, analysis of variance, and goodness of fit tests. Special topics may include nonparametric tests, nonlinear regression, and time series analysis. Prerequisites: 171, 225 and 270. Offered in odd numbered spring semesters.

**Rationale :** The new course description more closely matches the material that is being covered in the course. The prerequisites must be changed to reflect the new courses. The two-course sequence MATH 325 has now been taught three times.

**10. MATH 361:**

**Old Course Title and Prerequisites: Analysis I**Prerequisite: 261 and 262. Offered every fall.

**New Course Title and Prerequisites: Real Analysis**Prerequisite: 171, 262 and 270. Offered every fall.

**Rationale :** The prerequisites must be changed to reflect the new courses. Also, long ago we removed Analysis II from the bulletin. We should drop the I from this course name. Also, Real Analysis more accurately describes the content of the course (analysis of the real numbers).

**11. MATH 351:**

**Old Course Title: Algebraic Structures**

**New Course Title: Abstract Algebra**

**Rationale :** Abstract Algebra is the name of this course at most colleges and

universities.

**C. Request the following changes to the major and minor as a result of the changes to course numbers.**

**Old Major and Minor:**

**Major**161 (or 151, 152), 162, 211, 261, 262, 351, 361   
One math course having 351 or 361 as a prerequisite   
One additional math course numbered 301 or higher   
Two mathematics electives numbered 201 or higher. One elective may be replaced by COMP 131-132 or by the professional semester for students pursuing certification in mathematics, or, upon prior approval by the department, a mathematics-intensive course from another department.

**Minor**162 and 211, one of the three courses 325, 351 or 361 and two other courses numbered 201 or higher. Possible tracks include: Track 1: 161, 162, 211, 261, 262, 361; Track 2: 161, 162, 211, 262, 351, elective; Track 3: 161, 162, 211, 225, 261, 325. Tracks 1 and 2 focus on theoretical mathematics. Track 3 focuses on statistics.

**New Major and Minor :**

**Major**170, 171, 211, 262, 270, 351, 361   
One math course having 351 or 361 as a prerequisite   
One additional math course numbered 301 or higher   
Two mathematics electives numbered 201 or higher. One elective may be replaced by COMP 131-132 or by the professional semester for students pursuing certification in mathematics, or, upon prior approval by the department, a mathematics-intensive course from another department.

**Minor**171 and 211, one of the three courses 325, 351 or 361 and two other courses numbered 201 or higher. Possible tracks include: Track 1: 170, 171, 211, 262, 270, 361; Track 2: 170, 171, 211, 262, 351, elective; Track 3: 170, 171, 211, 225, 270, 325. Tracks 1 and 2 focus on theoretical mathematics. Track 3 focuses on statistics.

**Rationale :** These revisions reflect the changes to courses.

**F. How do I know when I need a new course number?  
  
Rationale for assigning a new course number to a course. The major factor in determining whether or not the course number changes is the course content/description. If a student who completed the current version of the course can take the proposed course for credit because the content has changed, then a new course number is required. If a student cannot take the new proposed course because it would be a repeat of the same content, then the course number can be retained.**

**POLICY ON COURSE RENUMBERING  
  
Use of an old course number for a new course cannot occur until the original course has been retired for at least six years.**