Minor Change to an Undergraduate Program

Program Name: Option in Statistics; General Option

Complete only if applicable

Program named above is:

☑ Option within B.A. in Mathematics

(degree program name)

☐ Advising Pattern within ____________________________

(option name)

within ____________________________

(degree program name)

☐ Minor

☐ Certificate

☐ Changes being made affect a subject matter preparation or credential program.

Brief rationale for change:

Allowing Math majors to take MATH 314 for credit in addition to MATH 350 would only increase the student’s ability to excel in MATH 350

Does the proposed change enhance or support the Diversity Action Plan (see definition & Task 3.1)? N

If yes, please explain.

Required Signatures

The Department of Mathematics and Statistics has reviewed and approves this program change

Chair, Department Curriculum Committee

Date

Department Chair

Date

The College of Natural Sciences has reviewed and approves this program change

Chair, College Curriculum Committee

Date

College Dean

Date

Send signature page with proposal attached to Curriculum Services at Undergraduate Education, zip 128 Curriculum Technical Review Completed

Date

OCT 18 2017

RECEIVED
Proposed changes to Math Majors Relative to MATH 314

Proposal: Allow 314 to count equivalently to 315, such that credit cannot be received for both classes, for all math majors that previously allowed 315.

Executive Summary: The General Option allows 315 as an elective. The Statistics Option requires 315. Both exclude 314. The statistics faculty no longer agree with this exclusion. As currently taught, 314 now maintains the breadth of, and dives deeper than, 315 (more everything, math and programming, and less nothing).

Details: This proposal requires the following changes.

1. Under the General Option, remove Math 314 from the excluded courses.

   **6 units selected from:**
   
   Any upper-division Mathematics (MATH) courses except MATH 305, MATH 310, MATH 311, **MATH 314**, MATH 341, MATH 342, and MATH 441.

2. As per 1., change the course catalogue description for Math 314.
   Credit cannot be received for both MATH 350 and MATH 314.
   
   2.1. Math 350 is a potential course for General Majors. Since General Majors previously were allowed to take 350 and 315, they should now be allowed to take 350 and 314.
   
   2.2. However, this proposal maintains that 314 and 315 should not both count for credit; it’s one or the other.


   **7 courses required:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 260</td>
<td>Elementary Differential Equations</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td><strong>MATH 315</strong></td>
<td><strong>Applied Statistical Methods I</strong></td>
<td>3.0</td>
<td>FA</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> MATH 121.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 350</td>
<td>Introduction to Probability and Statistics</td>
<td>3.0</td>
<td>FA</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> MATH 121.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 351</td>
<td>Introduction to Probability and Statistics</td>
<td>3.0</td>
<td>SP</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> MATH 350.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 450</td>
<td>Mathematical Statistics</td>
<td>3.0</td>
<td>FA</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> MATH 220, MATH 330, MATH 351.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 456</td>
<td>Applied Statistical Methods II</td>
<td>3.0</td>
<td>S2</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> MATH 315.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 458</td>
<td>Sampling Methods</td>
<td>3.0</td>
<td>S1</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> One course chosen from MATH 105, MATH 305, MATH 350, or MATH 315.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

1 Math 350 used to be a required course, but subject to our 2016-12-02 Department meeting, Item “New General Math Option Revision,” Math 350 is now a [one of] course – hence, potential.
1 course selected from:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 314</td>
<td>Probability and Statistics for Science and Technology</td>
<td>4.0</td>
<td>FS</td>
</tr>
<tr>
<td></td>
<td>Prerequisites: MATH 121.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 315</td>
<td>Applied Statistical Methods I</td>
<td>3.0</td>
<td>FS</td>
</tr>
<tr>
<td></td>
<td>Prerequisites: Completion of ELM requirement. Introduction to common procedures used to analyze data.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Under the Statistics Option, remove Math 314 from the excluded courses.

3 units selected from:

Any upper-division mathematics (MATH) courses except MATH 310, MATH 311, MATH 341, MATH 342, and MATH 441.

Justification:

Our math students should be encouraged in their degree maps to take more mathematically rigorous courses, or at the least not be restricted from doing so. This proposal better aligns our Department’s degree maps to meet this criterion.

As taught Math 314 maintains the breadth of, and dives deeper than, Math 315; n.b., Math 121 is a prerequisite for Math 314 and it is not for Math 315. This is possible since Math 314 is a four unit course whereas Math 315 is a three unit course. Math 314 uses more advanced calculus and requires more rigorous computer programming. Thus, it is the opinion of this proposal that Math 314 is at least as well suited to the future success of our math majors as is Math 315. As such, Math 314 should count equivalently to Math 315 in all the cases that Math 315 was previously allowed, such that credit is not given to both courses.
The Bachelor of Science in Mathematics

Total Course Requirements for the Bachelor's Degree: 120 units

See Bachelor's Degree Requirements in the University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. You can view MAPs on the Degree MAPs page in the University Catalog or you can request a plan from your major advisor.

General Education Pathway Requirements: 48 units

See General Education in the University Catalog and the Class Schedule for the most current information on General Education Pathway Requirements and course offerings.

This major has approved GE modification(s). See below for information on how to apply these modification(s).

- MATH 217 is an approved major course substitution for Critical Thinking (A3).
- MATH 330 is an approved major course substitution for Upper-Division Natural Sciences.
- MATH 420 is an approved GE Capstone substitution.

These modifications apply to The Option in Mathematics Education - Credential Path only

- EDTE 451 fulfills Learning for Life (E)
- EDTE 302, ENGL 471, and MATH 333 fulfill the Upper-Division Pathway requirement.

Diversity Course Requirements: 6 units

See Diversity Requirements in the University Catalog. Most courses taken to satisfy these requirements may also apply to General Education.

Literacy Requirement:

See Mathematics and Writing Requirements in the University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or higher to receive WP credit. See the Class Schedule for the
designated WP courses for each semester. You must complete the GE Written Communication (A2) requirement before you may register for a WP course.

**Course Requirements for the Major: 49-52 units**

Completion of the following courses, or their approved transfer equivalents, is required of all candidates for this degree. Additional required courses, depending upon the selected option are outlined following the major core program requirements.

**Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.**

**Major Core Program: 24-25 units**

**6 courses required:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Year</th>
<th>Grade</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 120</td>
<td>Analytic Geometry and Calculus</td>
<td>4.0</td>
<td>FS</td>
<td>GE</td>
<td>Completion of ELM requirement; both MATH 118 and MATH 119 (or college equivalent); first-year freshmen who successfully completed trigonometry and precalculus in high school can meet this prerequisite by achieving a score that meets department guidelines on a department administered calculus readiness exam.</td>
</tr>
<tr>
<td>MATH 121</td>
<td>Analytic Geometry and Calculus</td>
<td>4.0</td>
<td>FS</td>
<td></td>
<td>MATH 120.</td>
</tr>
<tr>
<td>MATH 220</td>
<td>Analytic Geometry and Calculus</td>
<td>4.0</td>
<td>FS</td>
<td></td>
<td>MATH 121.</td>
</tr>
<tr>
<td>MATH 235</td>
<td>Elementary Linear Algebra</td>
<td>3.0</td>
<td>FS</td>
<td></td>
<td>MATH 121.</td>
</tr>
<tr>
<td>MATH 330</td>
<td>Methods of Proof</td>
<td>3.0</td>
<td>FS</td>
<td></td>
<td>MATH 121.</td>
</tr>
<tr>
<td>MATH 420</td>
<td>Advanced Calculus</td>
<td>3.0</td>
<td>FS</td>
<td>WP</td>
<td>Completion of GE Written Communication (A2) requirement, MATH 220, MATH 330, upper-division standing.</td>
</tr>
</tbody>
</table>

The MATH 120, MATH 121, MATH 220 sequence should be started as early as possible, provided the student has the necessary background. MATH 118 and MATH 119 (or their equivalents) are required pre-calculus courses for MATH 120.

Some upper-division courses require only MATH 120 or MATH 121 as a prerequisite. Refer to catalog course listings when choosing courses.

**Computer Literacy Requirement**

A passing grade in one of the following classes or its transfer equivalent.
1 course selected from:

- CINS 110 Introductory Web Programming 3.0 FS
- CSCI 111 Programming and Algorithms I 4.0 FS

Prerequisite: Completion of ELM requirement.

MATH 230 An Introduction to Computational Mathematics 3.0 FA
Prerequisites: MATH 121, no previous computer experience required.

Major Option Course Requirements: 25-27 units

The following courses, or their approved transfer equivalents, are required dependent upon the option chosen. Students must select one of the following options for completion of the major course requirements. Use the links below to jump to your chosen option.

- The Option in General Mathematics
- The Option in Applied Mathematics
- The Option in Mathematics Education
- The Option in Mathematics Education - Credential Path
- The Option in Statistics

The Option in General Mathematics: 25 units

4 courses required:

- MATH 260 Elementary Differential Equations 4.0 FS
Prerequisites: MATH 121.

- MATH 350 Introduction to Probability and Statistics 3.0 FA
Prerequisites: MATH 121.

- MATH 421 Advanced Calculus 3.0 SP
Prerequisites: MATH 420.

- MATH 465 Introduction to Complex Variables 3.0 FA
Prerequisites: MATH 220.

1 course selected from:

- MATH 346 College Geometry 3.0 SP
Prerequisites: MATH 220, MATH 330.
MATH 437 Topology 3.0 S2
Prerequisites: MATH 220, MATH 330.

1 course selected from:

MATH 435 Linear Algebra 3.0 FA
Prerequisites: MATH 220, MATH 235, MATH 330.
MATH 449 Modern Algebra 3.0 SP
Prerequisites: MATH 220, MATH 235, MATH 330.

6 units selected from:

Any upper-division Mathematics (MATH) courses except MATH 305, MATH 310, MATH 311, MATH 314, MATH 341, MATH 342, and MATH 441.

The Option in Applied Mathematics: 25 units

7 courses required:

MATH 260 Elementary Differential Equations 4.0 FS
Prerequisites: MATH 121.
MATH 350 Introduction to Probability and Statistics 3.0 FA
Prerequisites: MATH 121.
MATH 360 Ordinary Differential Equations 3.0 SP
Prerequisites: MATH 260.
MATH 361 Boundary Value Problems and Partial Differential Equations 3.0 FA
Prerequisites: MATH 260.
MATH 461 Numerical Analysis 3.0 SP
Prerequisites: MATH 220 or MATH 260; completion of computer literacy requirement.
MATH 465 Introduction to Complex Variables 3.0 FA
Prerequisites: MATH 220.
MATH 480 Mathematical Modeling 3.0 SP
Prerequisites: MATH 235, MATH 260.

1 course selected from:

MATH 472 Introduction to Chaotic Dynamical Systems 3.0 F1
Prerequisites: MATH 260. Recommended: MATH 235, MATH 360.
MATH 475 Calculus of Variations 3.0 F2
Prerequisites: MATH 260; MATH 361 is recommended.
The Option in Mathematics Education: 25-27 units

The following program, together with the major core program, fulfills all requirements for the Single Subject Matter Preparation Program in Mathematics.

7 courses required:

- MATH 305 Conceptual and Practical Statistics 3.0 SP
  Prerequisites: MATH 120 or MATH 109 (may be taken concurrently).

- MATH 333 History of Mathematics 3.0 SP
  Prerequisites: MATH 220 and at least one upper-division mathematics course.

- MATH 337 Introduction to the Theory of Numbers 3.0 FA
  Prerequisites: MATH 121, MATH 330.

- MATH 341 Mathematical Topics for the Credential 3.0 FA
  Prerequisites: MATH 121.

- MATH 342 Math Topics for the Credential 3.0 SP
  Prerequisites: MATH 341.

- MATH 346 College Geometry 3.0 SP
  Prerequisites: MATH 220, MATH 330.

- MATH 449 Modern Algebra 3.0 SP
  Prerequisites: MATH 220, MATH 235, MATH 330.

1 course selected from:

- MATH 195 Project MATH Seminar Year 1 1.0 FS

- MATH 241 Secondary Math Early Field Experience 1.0 FS

3-5 units selected from:

Note: If MATH 441 is chosen, an additional unit of MATH 241 or MATH 295 must be taken.

- MATH 442 Mathematics and the Teaching of Mathematics 3.0 FA
  Prerequisites: MATH 342.

Or the following group of courses may be selected:

- MATH 295 Project MATH Seminar Year 2 1.0 FS
  Prerequisite: MATH 195.

- MATH 441 Math Topics for the Credential 4.0 FS
Prerequisites: MATH 342.
Corequisites: Assignment as a Mathematics Department intern.

Or the following group of courses may be selected:

MATH 241 Secondary Math Early Field Experience 1.0 FS
MATH 441 Math Topics for the Credential 4.0 FS
Prerequisites: MATH 342.
Corequisites: Assignment as a Mathematics Department intern.

Subject matter preparation requirements are governed by federal and state legislative action and approval of the California Commission on Teacher Credentialing. Requirements may change between catalogs. Please consult with your departmental credential advisor for current information.

The Option in Mathematics Education - Credential Path: 73-75 units

The following program, together with the major core program, fulfills all requirements for both a degree in Mathematics (Mathematics Education Option) and the Single Subject Credential in Mathematics.

Mathematics

7 courses required:

MATH 305  Conceptual and Practical Statistics 3.0 SP
Prerequisites: MATH 120 or MATH 109 (may be taken concurrently).
MATH 333  History of Mathematics 3.0 SP
Prerequisites: MATH 220 and at least one upper-division mathematics course.
MATH 337  Introduction to the Theory of Numbers 3.0 FA
Prerequisites: MATH 121, MATH 330.
MATH 341  Mathematical Topics for the Credential 3.0 FA
Prerequisites: MATH 121.
MATH 342  Math Topics for the Credential 3.0 SP
Prerequisites: MATH 341.
MATH 346  College Geometry 3.0 SP
Prerequisites: MATH 220, MATH 330.
MATH 449  Modern Algebra 3.0 SP
Prerequisites: MATH 220, MATH 235, MATH 330.
2 units selected from:

MATH 195 Project MATH Seminar Year 1 1.0 FS
MATH 241 Secondary Math Early Field Experience 1.0 FS

Education

9 courses required:

EDTE 302  Access and Equity in Education 3.0 FS
EDTE 530  Fundamentals of Teaching Practice for Secondary Teachers 3.0 FS
EDTE 532  Literacy Development 3.0 FS
EDTE 534  Teaching Special Populations 2.0 FS
EDTE 535A Teaching Practicum I for Blended Mathematics Candidates 3.0 FS
EDTE 536  Subject Area Pedagogy II 3.0 FS
EDTE 537  Applications for Democratic Education 3.0 FS
Prerequisites: Capstone course to be taken in the final semester of the program.
EDTE 538  Teaching Practicum II 9.0 FS
Prerequisites: Successful completion of Practicum I (EDTE 535).
EDTE 580  Educational Psychology 3.0 FS
Prerequisites: Conditional admission to a Professional Education Program.

Additional Requirements

5 courses required:

CMST 131 Speech Communication Fundamentals 3.0 FS GE
EDTE 451  Health Education for Secondary School Teachers 3.0 FS
ENGL 471  Intensive Theory and Practice of Second Language Acquisition 3.0 FS
POLS 155  American Government: National, State, and Local 3.0 SMF GE
HIST 130  United States History 3.0 SMF GE

3-5 units selected from:

Note: If MATH 441 is chosen, an additional unit of MATH 241 or MATH 295 must be taken.

MATH 442 Mathematics and the Teaching of Mathematics 3.0 FA
Prerequisites: MATH 342.
Or the following group of courses may be selected:

MATH 295  Project MATH Seminar Year 2  1.0  FS  
Prerequisite: MATH 195.

MATH 441  Math Topics for the Credential  4.0  FS  
Prerequisites: MATH 342.  
Corequisites: Assignment as a Mathematics Department intern.

Or the following group of courses may be selected:

MATH 241  Secondary Math Early Field Experience  1.0 FS  
MATH 441  Math Topics for the Credential  4.0 FS  
Prerequisites: MATH 342.  
Corequisites: Assignment as a Mathematics Department intern.

Note: A Major Academic Plan (MAP) is available for this option so students can complete it in four years. Please request a plan from your major advisor or view it at Degree MAPs. It is important to follow this plan carefully as there are several GE substitutions that apply only if the entire program is completed.

The Option in Statistics: 25-26 units

7 6 courses required:

MATH 260  Elementary Differential Equations  4.0  FS  
Prerequisites: MATH 121.

MATH 315  Applied Statistical Methods I  - 3.0  FS  -  
Prerequisite: MATH 105, MATH 109, or MATH 120, or faculty permission.

MATH 350  Introduction to Probability and Statistics  3.0  FA  
Prerequisites: MATH 121.

MATH 351  Introduction to Probability and Statistics  3.0  SP  
Prerequisites: MATH 350.

MATH 450  Mathematical Statistics  3.0  FA  
Prerequisites: MATH 220, MATH 330, MATH 351.

MATH 456  Applied Statistical Methods II  3.0  S2  
Prerequisites: MATH 315.

MATH 458  Sampling Methods  3.0  S1  
Prerequisites: One course chosen from MATH 105, MATH 305, MATH 350, or MATH 315.
1 course selected from:

MATH 314 Probability and Statistics for Science and Tech   4.0 FS
MATH 315 Applied Statistical Methods   3.0 FS

3 units selected from:

Any upper-division mathematics (MATH) courses except MATH 310, MATH 311, MATH 314, MATH 341, MATH 342, and MATH 441.

Electives Requirement:

To complete the total units required for the bachelor's degree, select additional elective courses from the total University offerings. You should consult with an advisor regarding the selection of courses which will provide breadth to your University experience and possibly apply to a supportive second major or minor.

Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

Grading Requirement:

All courses taken to fulfill major course requirements must be taken for a letter grade except those courses specified by the department as Credit/No Credit grading only.

Advising Requirement:

Advising is mandatory for all majors in this degree program. Consult your undergraduate advisor for specific information.

A student may complete more than one option in the major. Only courses specifically required by both options may be double counted.

Honors in the Major:

Honors in the Major is a program of independent work in your major. It requires 6 units of honors course work completed over two semesters.

The Honors in the Major program allows you to work closely with a faculty mentor in your area of interest on an original performance or research project. This year-long collaboration allows you to work in your field at a professional level and culminates in a public presentation of your work. Students sometimes take their projects beyond the University for submission in professional journals, presentation at conferences, or academic competition. Such experience is valuable for graduate school and professional life. Your honors work will be recognized at your
graduation, on your permanent transcripts, and on your diploma. It is often accompanied by letters of commendation from your mentor in the department or the department chair.

Some common features of Honors in the Major program are:

1. You must take 6 units of Honors in the Major course work. All 6 units are honors classes (marked by a suffix of H), and at least 3 of these units are independent study (399H, 499H, 599H) as specified by your department. You must complete each class with a minimum grade of B.
2. You must have completed 9 units of upper-division course work or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements for your major carefully, as there may be specific courses that must be included in these units.
3. Your *cumulative* GPA should be at least 3.5 or within the top 5% of majors in your department.
4. Your GPA *in your major* should be at least 3.5 or within the top 5% of majors in your department.
5. Most students apply for or are invited to participate in Honors in the Major during the second semester of their junior year. Then they complete the 6 units of course work over the two semesters of their senior year.
6. Your honors work culminates with a public presentation of your honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major advisor to apply.

**Honors in Mathematics**

Well-qualified Mathematics majors are encouraged to apply for Honors in Mathematics. The program is open to junior and senior Mathematics majors who have completed 9 upper-division units (or a total of 24 units) in mathematics, including MATH 420 with a grade of B or better, and have a grade point average among the top 5% of junior-senior mathematics majors. Please visit the department office in HOLT 181 for further