Office of the President
California State University, Chico

Executive Memorandum 18-015

May 30, 2018

From: Gayle E. Hutchinson, President

Subject: New Option in Foundational Mathematics Education

Upon the recommendation of the Academic Senate and the concurrence of the Provost, I approve the addition of a New Option in Foundational Mathematics Education in the Department of Mathematics and Statistics within the College of Natural Sciences. The total number of units required for the option will be 22 and it will be effective in fall 2019.

Policy Title:	EM 18-015 New Option in Foundational Mathematics Education
Contact:	Department of Mathematics and Statistics
Supersedes:	
Revision:	
Enabling Legislation or Executive Order:	

New Undergraduate Option or Advising Pattern

Program Name: Foundational Mathematics Education

Program named above is:
☑ Option within B.S. Mathematics
(degree program name)

☐ Advising Pattern within _____
(option name)

within _____
(degree program name)

Department Contact(s) w/phone #(s):
M.E. Matthews, x5469; Jorgen Berglund, x5350; Rick Ford, x6111

Required Signatures

The Department of Mathematics and Statistics
has reviewed and approved this new program

_____ 9-5-17
Chair, Department Curriculum Committee — Date

_____ 9-5-17
Department Chair — Date

The College of Natural Sciences
has reviewed and approved this new program

_____ 9/29/17
Chair, College Curriculum Committee — Date

_____ OCT 16 2017
College Dean — Date

Send signature page with proposal attached to Curriculum Services at Undergraduate Education, zip 680

Curriculum Review Completed _____
Date

Note: The department will be notified on the of dates for EPPC, Academic Senate, and Chancellor's Office (if applicable) review and number of copies needed.

Abstract Summary of new option in the BS in Mathematics

Reasoning:

There is a dire teacher shortage, and CA is no exception. Mathematics teachers are particularly in need. (Each year, members of the math department receive emails from area schools into the school year looking for anyone with a bachelor's degree to come fill their classrooms.) This new option would provide a pathway to earn a bachelor's degree and earn a waiver to enter a credential program to teach grades 6-12. Chico State has always been a leader in teacher education, and this will be the first bachelor's program in the state that is also a waiver program.

Financial Consideration:

All courses listed as part of this option are existing courses. With the exception of Math 310, all classes are currently well below their enrollment caps. Math 310 sections are numerous, and it will not be difficult for students to enroll or to open new sections when needed.

Smaller changes which will come for approval via CPCRs upon approval of the new option:

- Change Math 310's prerequisites from Math 210 to Math 210 or Math 225
- Change Math 333's prerequisites from "Math 220 and at least one upper-division math class" to "At least one upper-division math class and either Math 220 or Math 225."
- Change Math 346's prerequisites from "Math 220, Math 330" to "Math 330 and either Math 220 or Math 225"

Proposal for a New Option

I. Proposed title of new option and name of degree program under which the new option will be offered.
B.S. in Mathematics, option in Foundational Mathematics Education

II. Academic year of intended implementation.
2019-20

III. Name of the department and college submitting the proposal.
   A. Identify the unit, which will have primary responsibility for the option.
   College of Natural Sciences, Department of Mathematics and Statistics
   B. Identify the level of the option (i.e., undergraduate or graduate).
   Undergraduate

IV. Statements on questions of need and demand.
   A. Relation of the program to the University Strategic Plan.
   This new option serves the university priority of "service to others" and "serv[ing] the educational… needs of Northern California." There is a great shortage of mathematics teachers throughout the state but especially in the North State. This program will serve to prepare students for a credential program in Foundational Level Mathematics.

   This new option serves the university priority of valuing diversity by supporting growth in the major and targeting students who want to teach but may be intimidated by a traditional mathematics program. These students may have come from regional schools without the resources to prepare students for Calculus in their freshman year.

   This new option supports the university value of "'student friendly' policies and practices that foster student achievement and progress toward degree" by providing an option for students who would like to teach mathematics but are intimidated by or uninterested in advanced content courses that do not apply to the middle and high school classrooms.

   B. Need for the proposed option.
      1. Identify other CSU campuses with the proposed option.
      None, though the CSU Chancellor's office is aware of and supports our initiative to bring this new option into the CSU system
      2. Identify neighboring institutions with the proposed option.
      None.
      3. Identify differences, if any, between these programs and the proposed program. **N/A**

C. Identify other closely related curricula currently offered by the campus.
B.S. in Mathematics, option in Mathematics Education
B.A. in Liberal Studies

1. Explain the impact the proposed option will have on these programs.
We expect that many of the students who leave the option in Mathematics Education but who still would like to teach will shift over to this option. We lose 2/3 of originally declared majors, and this would help stop those losses.
We expect that several students (3-6) each year who pursue a LBST degree in order to teach middle school mathematics would change into this major.
2. Explain how current programs do not meet the proposed option's objectives.
The option in Mathematics Education is a waiver program to enter a credential program for middle and high school teaching. However, the undergraduate mathematics is focused on developing high school content and beyond. The LBST degree focuses on other content areas and on mathematics K-8 in only 3 classes. This degree program seeks to serve students interested in teaching mathematics in grades 6-10 and to prepare them to be highly-qualified teachers.

D. Student demand for the program.

1. Give evidence of serious student interest in the proposed option.
We have had at least 4 students enrolled in each test section of the courses we have developed over the last 3 years. They took these courses without being able to use the credits for anything but electives because they have an interest in teaching middle school mathematics.
We have 2 students who would be ready and willing to graduate with this major in Spring '18.
We have 4 students enrolled in the course this fall who are considering dropping the B.S. in Mathematics but would stay if this option were available.
All of these students have been willing to participate without the guarantee of a degree program, and we know of several others who would consider the program if it were available.
2. Estimated number of students seeking the option
   a. in the year of initiation.
   4-8
   b. after three years.
   25
   c. after five years.
   40

d. Describe methodology for developing these estimates.
We know of 4 students who wish to participate this fall. If we have the option available, we estimate we can keep 6 from leaving the major, bring in 6 students from LBST, and recruit 6 from across the state who are interested in a program focused on developing middle school teachers each year.

3. Estimate the number of options awarded
   a. in the year of initiation.
   2
   b. after three years.
   5 (9 cumulative)
   c. after five years.
   12-18/year
   d. Describe methodology for developing these estimates.
   We have two students who have been participating in our coursework development who are set to graduate Spring '18 (though they are completing a different major). Based on those students and students who would shift out of the Mathematics Education option (or even another option if they decide to teach middle school), the next couple of years would see growth of people finishing their last few years within the option. Finally, in 5 years' time, we would have students each year who would come explicitly for a program for people wishing to teach grades 6-10 mathematics. We also believe that more transfer students would choose this option to complete a major within two years.

E. Identify professional uses for the proposed option.
This option would serve as a waiver program to enter a credential program in Foundational Level Mathematics. Students completing such a credential become certified to teach grades 6-10 mathematics.

V. Resources

A. List the faculty members for the required courses in the program by

Jorgen Berglund
Full Professor
Full-time
Ph.D.
1997 Mathematics
Trainer of pre-service teachers and professional development provider for in-service teachers, focus on development of mathematical content knowledge

M.E. Matthews
Assistant Professor

Full-time
Ed.D.
2014 Mathematics Education
Trainer of pre-service teachers and professional development provider for in-service teachers, focus on development of mathematical content knowledge

LaDawn Haws
Full Professor
Full-time
Ph.D.
1987 Applied Mathematics
Applied mathematician who has taught the History of Mathematics for more than the last ten years to help pre-service teachers make connections between mathematics and real-world experiences.

Krista Strand
Assistant Professor
Full-time
Ph.D.
2016 Mathematics Education
Trainer of pre-service teachers and professional development provider for in-service teachers, focus on K-8 teacher development

B. List the faculty members for the elective courses in the program by
Same as above

C. List the resources needed to sustain the program for the first five years, including cost and funding source.
Faculty – first year will be covered by the PRISMS/NGMT Grant
Staff – program recruiter covered by PRISMS/NGMT grant
Facilities – None needed
Library resources – None needed
Equipment – None needed
Specialized material – None needed

D. Additional support resources required, including source of support.
None needed

VI. Curriculum
Note: Proposed curriculum should take advantage of courses already offered in other departments when subject matter would otherwise overlap or duplicate existing course content.

A. Total number of units required for option.
22

B. Special criteria for admission and/or continuation (if applicable).
None.

C. Explanation of any special program characteristics (e.g., terminology, credit units required, types of coursework, etc.).
"Waiver program" refers to the program taking place of two CSET tests to gain entry into a Foundational Level Mathematics credential program. This will be the only waiver program for the FLM in the state that also grants a bachelor's degree.

D. List all new courses for the proposed program.
None.

E. List all required courses for the program. ***Pending approval of changes to Major Core Program**

Major Core Program: 26-29 units

5 courses required:

MATH 120	Analytic Geometry and Calculus	4.0	FS	GE

Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or college equivalent); firs 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.

MATH 121	Analytic Geometry and Calculus	4.0	FS

Prerequisites: MATH 120.

MATH 235	Elementary Linear Algebra	3.0	FS

Prerequisites: MATH 121.

MATH 330	Methods of Proof	3.0	FS

Prerequisites: MATH 121.

MATH 300	**Undergraduate Mathematics Seminar**	2.0	FS

4-6 units selected from:

MATH 220	Analytic Geometry and Calculus	4.0	FS

Prerequisites: MATH 121.

Or the following group of courses may be selected:

MATH 125	Advanced Number and Operation	3.0	FA

Prerequisites: Completion of ELM requirement; High school precalculus or equivalent.

MATH 225	Cardinality, Sequences, Series, and Infinity	3.0	SP

Prerequisites: MATH 125.

1 course selected from:

MATH 420	Advanced Calculus	3.0	FS	WP

Prerequisites: Completion of GE Written Communication (A2) requirement, MATH 220, MATH 330, upper-division standing.

MATH 425	Mathematical Modeling: Algebra through Calculus	3.0	FA	WP*

Prerequisites: MATH 225, MATH 235, MATH 330.

MATH 435	Linear Algebra	3.0	FA	WP*

Prerequisites: MATH 220, MATH 235, MATH 330.

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.

The Option in Foundational Mathematics Edu cation: 22 units

The following program, together with the major core program, fulfills all requirements for the Foundational 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 310	Patterns and Structures in Mathematics	3.0	FS

Prerequisites: Math 110, Math 210.

MATH 333	History of Mathematics	3.0	SP

Prerequisites: MATH 220 and at least one upper-division mathematics course.

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 442	Mathematics and the Teaching of Mathematics	3.0	FA
Prerequisites: MATH 342.			
1 course selected from:			
MATH 195	Project MATH Seminar Year 1	1.0	FS
MATH 241	Secondary Math Early Field Experience	1.0	FS

F. List all elective courses for the program.
None.

G. For undergraduate options, explain provisions for articulation of the proposed option with community college courses.
There are no changes to the community-college level courses as compared to the other existing options.

H. Writing Requirement
   1. For an undergraduate option, list the number and title of the Writing Proficiency (WP) course for the option. List the WP course for the degree program if it is different from the WP course for the option. **Same as the program—Math 420, 425, or 435.**
   2. ~~For a graduate option, indicate how the graduate literacy requirement is met within the option and/or degree program.~~

I. ~~For a graduate option, indicate the culminating activity for the option and/or degree program.~~

J. Complete catalog copy, including full degree requirements (i.e., a catalog description of the full degree program, not just the option being proposed), and admission and completion requirements. See the current University Catalog for correct format; please follow it exactly. Before the proposal is submitted to Academic Affairs (for undergraduate options) or to the Office

K. For undergraduate programs, include a Major Academic Plan (MAP) with the proposal. If you have questions or need help, contact Academic Advising Programs.

Attach the Undergraduate Program Signature form or the Graduate Program Signature form to the front of the proposal and submit to Curriculum Services in Undergraduate Education or the Office of Graduate Studies after all department and college reviews are complete.

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.

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 .

Upper-Division Writing Requirement:

Writing Across the Curriculum (Executive Memorandum 17-009) is a graduation requirement and may be demonstrated through satisfactory completion of four Writing (W) courses, two of which are designated by the major department. See Mathematics/Quantitative Reasoning and Writing Requirements in the *University Catalog* for more details on the four courses. The first of the major designated Writing (W) courses is listed below.

- Any upper-division Writing (W) course.

The second major-designated Writing course is the Graduation Writing Assessment Requirement (GW) (Executive Order 665). Students must earn a C- or higher to receive GW credit. The GE Written Communication (A2) requirement must be completed before a student is permitted to register for a GW course.

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.

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

Course Requirements for the Major: ~~49-52~~ 48-56 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.

Major Core Program: ~~24-25~~ 26-29 units

~~6~~ 5 courses required:

MATH 120	Analytic Geometry and Calculus	4.0	FS	GE
Prerequisites: 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.				
MATH 121	Analytic Geometry and Calculus	4.0	FS	
Prerequisites: MATH 120.				
~~MATH 220~~	~~Analytic Geometry and Calculus~~	~~4.0~~	~~FS~~	
~~Prerequisites: MATH 121.~~				
MATH 235	Elementary Linear Algebra	3.0	FS	
Prerequisites: MATH 121.				
MATH 300	Undergraduate Math Seminar	2.0	FS	
MATH 330	Methods of Proof	3.0	FS	
Prerequisites: MATH 121.				
~~MATH 420W~~	~~Advanced Calculus (W)~~	~~3.0~~	~~FS~~	~~GW W~~
~~Prerequisites: Completion of GE Written Communication (A2) requirement, MATH 220, MATH 330, upper-division standing.~~				

4-6 units selected from:

MATH 220 Analytic Geometry and Calculus 4.0 FS
Prerequisite: MATH 121.

Or the following group of courses may be selected:

MATH 125 Advanced Number and Operation 3.0 FA
Prerequisite: High school precalculus or equivalent
MATH 225 Advanced Algebraic Structures 3.0 SP
Prerequisites: MATH 125

1 course selected from:

MATH 420W Advanced Calculus (W) 3.0 FS GE W
Prerequisites: Completion of GE Written Communication (A2) requirement, MATH 220, MATH 330, upper-division standing.
MATH 425 Mathematical Modeling Algebra through Calculus 3.0 FA *Applying for W
Prerequisites: MATH 225, MATH 235, MATH 330
MATH 435 Linear Algebra 3.0 FA *Applying for W
Prerequisites: MATH 220, MATH 235, MATH 330

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: MATH 119 (or high school equivalent).
MATH 230 An Introduction to Computational Mathematics 3.0 FA

Prerequisites: MATH 121, no previous computer experience required.

Major Option Course Requirements: ~~25~~ 22-27 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 Foundational Mathematics Education

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 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

6 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 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 Technology	4.0 FS

Prerequisite: MATH 121.

MATH 315	Applied Statistical Methods I	3.0 FS

Prerequisite: MATH 105, MATH 109, or MATH 120, or faculty permission.

3 units selected from:

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

The Option in Foundational Mathematics Education: 22 units

The following program, together with the major core program, fulfills all requirements for the Foundational 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 310 Patterns and Structures in Mathematics 3.0 FS

Prerequisites: Math 110, Math 210.

MATH 333 History of Mathematics 3.0 SP

Prerequisites: MATH 220 and at least one upper-division mathematics course.

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 442 Mathematics and the Teaching of Mathematics 3.0 FA

Prerequisites: MATH 342.

1 course selected from:

MATH 195 Project MATH Seminar Year1 1.0 FS

MATH 241 Secondary Math Early Field Experience 1.0 FS

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.

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 420W 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 information.