

PROGRAM MODIFICATION PROPOSAL FORM

Name of Institution: Coastal Carolina University (CCU)

Briefly state the nature of the proposed modification (e.g., adding a new concentration, extending the program to a new site, curriculum change, etc.):

Coastal Carolina University's Department of Mathematics and Statistics is proposing the creation of two concentrations within the Bachelor of Science in Applied Mathematics:

1. Teacher Preparation for students planning on going to the MAT program after completing the BS,
2. Graduate School Preparation.

Every Applied Mathematics major will select one of the two concentrations. The current major is 60 credits (23 Foundation + 37 Major requirements). The proposed major is 53 or 54 credits, depending on concentration (13 Foundation + 19 Major requirements + 21 or 22 Concentration).

Current Name of Program: Bachelor of Science (B.S.) in Applied Mathematics

Proposed Name of Program: Bachelor of Science (B.S.) in Applied Mathematics with concentrations in:

- Teacher Preparation
- Graduate School Preparation

Program Designation:

- Associate's Degree Master's Degree
 Bachelor's Degree: 4 Year Specialist
 Bachelor's Degree: 5 Year Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA)
 Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.)

Does the program currently qualify for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes
 No

If No, should the program be considered for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes
 No

Proposed Date of Implementation: Fall 2019

CIP Code: 27.0301

Current delivery site(s) and modes: CCU Main Campus, Traditional/face to face

Proposed delivery site(s) and modes: CCU Main Campus, Traditional/face to face

Program Contact Information:

Tom R. Hoffman, Ph.D.
Professor and Chair, Department of Mathematics and Statistics
843-349-2249
thoffman@coastal.edu

Institutional Approvals and Dates of Approval:

Faculty, Dept. of Mathematics and Statistics	Jan 9 th , 2019
Chair, Dept. of Mathematics and Statistics	Feb 6 th , 2019
College of Science Curriculum Committee	Feb 19 th , 2019
College of Science Dean	Feb 19 th , 2019
Academic Affairs Chair	Apr 11 th , 2019
Faculty Senate	May 1 st , 2019
Provost	May 2 nd , 2019
President	May 2 nd , 2019

Background Information

CCU's Department of Mathematics and Statistics proposes creating two concentrations within the Applied Mathematics major: 1. Teacher Preparation, 2 Graduate School Preparation. Every student majoring in Applied Mathematics will declare one of the two concentrations.

Over the last several years, the departmental assessment has shown that the majority of the students in the Applied Mathematics program are meeting our student learning objectives. Furthermore, our graduates who are attending graduate school are reporting success in their programs. However, the most of our undergraduates are planning on teaching mathematics at the high school level. In a review of the requirements for teaching licensure in South Carolina, the current Applied Mathematics program does meet these requirements but includes coursework which is unnecessary and is possibly turning away prospective teachers. The proposed program will benefit all Applied Mathematics students by helping them focus on the topics and content intended for their career path without losing rigor.

The proposed modifications of the B.S. in Applied Mathematics amounts to an innovation that supports the University's Strategic Goal 1.4 ("Promote a range of diverse learning opportunities, innovative curricula and programs") and its sub-objective 1.4.5 ("CCU will support high-quality innovative programs and curricula aligned with student demands, accreditation and standards expectations, regulatory requirements, and supportive professional preparation . . .").

Assessment of Need

For many years, mathematics is an area of critical need for teachers in South Carolina and specifically, Horry, Georgetown, and Marion Counties. Over the past few years, some requirements of CCU's Applied Mathematics major have acted as roadblocks to students interested in teaching high school mathematics. These requirements are in the major to make sure students are prepared for graduate school. The current program is generalist and therefore not serving either population of students to the fullest.

Students in the Teacher Preparation concentration will meet all of the requirements for licensure and entrance into CCU's Master of Arts program for mathematics as well as exposure to a variety of pedagogical methods in their classes. Students in the Graduate School preparation concentration will complete course work preparing them to succeed in graduate programs.

Transfer and Articulation

Not applicable for this program.

Description of the Program

Projected Enrollment						
Year	Fall Headcount		Spring Headcount		Summer Headcount	
	New	Total	New	Total	New	Total
2019-2020	18	61	1	56	0	0
2020-2021	18	62	1	57	0	0
2021-2022	19	63	1	58	0	0
2022-2023	19	64	1	59	0	0
2023-2024	19	65	1	60	0	0

Undergraduate enrollment at the University has experienced a four-year growth of 5.5%. The first row of the table above, that is 2019-2020, is based on actual student enrollment at CCU in the Applied Mathematics program. The remaining years (2020-2021 to 2023-2024) were estimated using a linear growth model of 5.5% from 2019-2020 to 2023-2024.

Curriculum

Bachelor of Science in Applied Mathematics (120 credits)

Core Curriculum Requirements

Core Curriculum (38-40 Total Credit Hours)

Graduation Requirements

Graduation Requirements (3-7+ Credits) *

Foundation Courses (13-17 Credits) *

Complete the following courses:

- STAT 201 – Introductory Statistics* (3 credits) AND
- STAT 201L – Introductory Statistics Laboratory* (1 credit)
- CSCI 140 - Introduction to Algorithmic Design I (3 credits) AND
- CSCI 140L - Introduction to Algorithmic Design I Laboratory (1 credit)
- MATH 160 - Calculus I (4 credits) *
- MATH 161 - Calculus II (4 credits)
- MATH 190 - Freshman Seminar in Mathematics (1 credit)

Note:

* Course credit hours only count once toward the total university graduation credit hour requirements.

Major Requirements (19 Credits)

Complete the following courses:

- MATH 220 - Mathematical Proofs and Problem Solving (3 credits)
- MATH 260 - Calculus III (4 credits)

- MATH 320 - Elementary Differential Equations (3 credits)
- MATH 344 - Linear Algebra (3 credits)
- MATH 490 - Seminar in Mathematics (3 credits)
- STAT 412 - Statistical Inference I (3 credits)

Concentration 1: Teacher Preparation (21 credits)

- MATH 331 – Foundation of Geometry (3 credits)
- MATH 384 – Functions, Applications, and Chaos (3 credits)
- MATH 446 – Abstract Algebra
- MATH 450 – Advanced Calculus I (3 credits) OR MATH 452 – Complex Variables (3 credits)
- Choose two MATH or STAT courses numbered 300 or above
- Choose one MATH or STAT course numbered 400 or above

Concentration 2: Graduate School Preparation (22 credits)

- MATH 242 - Modeling for Scientists I (3 credits) AND
- MATH 242L - Modeling for Scientists I (1 credit) Laboratory
- MATH 450 – Advanced Calculus I (3 credits)
- MATH 454 – Advanced Calculus II (3 credits) OR
- MATH 446 – Abstract Algebra (3 credits)
- Choose two MATH or STAT courses numbered 300 or above (except MATH 330, MATH 331, and MATH 384)
- Choose two MATH or STAT course numbered 400 or above

Cognate Requirements (9 Credits)

Mathematics majors will select an interdisciplinary cognate of upper level courses numbered 300 or above with the approval of their faculty adviser. A grade of 'C' or better is required in each course to be applied toward the cognate. A minor will fulfill this requirement.

Electives (7-17 Credits)

Total Credits Required: 120

Curriculum Changes

Courses Eliminated from Program	Courses Added to Program	Core Courses Modified
PHYS 211 Essentials of Physics I	STAT 201 Introductory Statistics	
PHYS 211L Essentials of Physics I Laboratory	STAT 201L Introductory Statistics Laboratory	
	MATH 331 Foundation of Geometry	
	MATH 384 Functions, Applications, and Chaos	

New Courses

STAT 201: Introductory Statistics. (3 credits) (Prereq: A grade of 'C' or better in MATH 130, MATH 130I, or MATH 139) (Coreq: STAT 201L) An introductory course in the fundamentals of modern statistical methods. Topics include descriptive statistics, introduction to probability, random variables and sampling distribution, linear regression and correlation, testing of hypothesis concerning one and two population samples, confidence interval estimation of parameters and introduction to one way ANOVA (analysis of variance). Primarily for students in the field of science who need basic knowledge of statistics.

STAT 201L: Introductory Statistics Laboratory. (1 credit) (Coreq: STAT 201) The computer laboratory involves exercises and/or lectures accompanying STAT 201. Students will use various statistical software. Laboratory exercises are designed to analyze data using appropriate tests/methods introduced in STAT 201.

MATH 331: Foundation of Geometry. (3 credits) (Prereq: MATH 160) Geometry taught from varying viewpoints. Includes basic geometric topics, taxicab geometry, and proof by pictures, and compass and straightedge constructions. May include a component involving technology. Other topics which may be covered include convex sets and the geometry of transformations.

MATH 384: Functions, Applications, and Chaos. (3 credits) (Prereq: A grade of 'C' or better in MATH 260) In this course we will use inquiry-based activities to explore a variety of math topics focused on in secondary mathematics curriculum with the goal of deepening and broadening your understanding of these topics.

Similar Programs in South Carolina offered by Public and Independent Institutions

Program Name and Designation	Total Credit Hours	Institution	Similarities	Differences
B.S. in Industrial Mathematics	49	USC Aiken	Major requirements are similar	Whereas CCU's concentrations are focused on teacher preparation and graduate school, USC Aiken's additional requirements are focused on preparation for industry.
B.S. in Mathematics and Engineering	41	Anderson University	Major requirements are similar	Whereas CCU's concentrations are focused on teacher preparation and graduate school, Anderson University's additional requirements are focused on engineering.
B.S. Applied Mathematics	69	Charleston Southern	Math courses in Major requirements are similar.	This major is only available to engineering dual degree program and is heavily focused on engineering.
B.S. in Mathematics	42	Presbyterian College	This program is very similar to our proposed major with the graduate school concentration.	We have more applied math courses as electives
B.S. in Mathematics with minor in Secondary Education	32	Presbyterian College	Their required math courses are similar to our foundation and major requirements.	Education courses for certification are built into this program. Our concentrations require additional math courses not required by this program.

Faculty

No changes in faculty, staff, or administrative personnel are needed as a direct result of this program modification. Existing faculty have the necessary expertise to teach the courses that have been added to the program. In the future, additional faculty and staff support will be determined by University allocation resources at that time.

Resources

Library Resources: No new library resources are required. Concentrations will use existing resources.

Equipment: No new equipment will be required for these concentrations.

Facilities: No new facilities will be required for these concentrations.

Impact on Existing Programs

Will the proposed program impact existing degree programs or services at the institution (e.g., course offerings or enrollment)? If yes, explain

Yes

No

Estimated Sources of Financing for the New Costs						
Category	1st	2nd	3rd	4th	5th	Total
Tuition Funding	\$1,139,220	\$1,181,867	\$1,225,765	\$1,270,946	\$1,317,444	\$6,135,243
Program-Specific Fees						\$0
Special State Appropriation						\$0
Reallocation of Existing Funds						\$0
Federal, Grant, or Other Funding						\$0
Total	\$1,139,220	\$1,181,867	\$1,225,765	\$1,270,946	\$1,317,444	\$6,135,243
Estimated New Costs by Year						
Category	1st	2nd	3rd	4th	5th	Total
Program Administration and Faculty and Staff Salaries	\$437,257	\$452,997	\$469,191	\$485,851	\$502,991	\$2,348,286
Facilities, Equipment, Supplies, and Materials						\$0
Library Resources						\$0
Other (specify)						\$0
Total	\$437,257	\$452,997	\$469,191	\$485,851	\$502,991	\$2,348,286
Net Total (i.e., Sources of Financing Minus Estimated New Costs)	\$701,962	\$728,871	\$756,575	\$785,095	\$814,454	\$3,786,957

Financial Support

Budget Justification

Provide a brief explanation for all new costs and sources of financing identified in the Financial Support table.

There are no additional costs associated with this modification. Adding the concentrations will allow the students to specialize in one area and be more marketable upon graduation. In the future, If enrollment does increase based on the concentrations, then additional faculty and staff support will be determined by University allocation resources at that time.

Evaluation and Assessment

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Methods of Assessment
1. Theoretical Foundations		
	1.1 Students will exhibit proficiency in a wide variety of proof techniques.	1. Program Assessment Test (PAT), problems 8 and 9 2. Final Exam Problems in Math 220, 344 and 450 3. Point of Instruction (POI) Quiz in Math 344
	1.2 Students will be able to apply theorems and definitions to solve problems.	1. Program Assessment Test problems 2, 5 and 12 2. Final Exam Problems in Math 260, 344 and 450 3. Point of Instruction Quiz in Math 260
2. Analytic and Quantitative Competency		
	2.1 Students will demonstrate facility in computation.	1. Program Assessment Test 2. Final Exam Problems in Math 160, 161, 260 and 320.
	2.2 Students will be able to apply mathematical concepts to solve problems.	1. Program assessment Test 2. Final exam Problems in Math 260 and 344
3. Written and Oral Communication		
	3.1 Mathematics majors will develop oral communication skills.	Scores on student presentations in Math 490
	3.2 Students will demonstrate the ability to write correct mathematical arguments and prose in an organized and coherent fashion.	1. Grades on student research papers in Math 490 2. Grades on student posters in Math 490 3. Final Exam Problems in Math 220, 344 and 450

Will any the proposed modification impact the way the program is evaluated and assessed? If yes, explain.

- Yes
 No

Will the proposed modification affect or result in program-specific accreditation? If yes, explain; and, if the modification will result in the program seeking program-specific accreditation, provide the institution's plans to seek accreditation, including the expected timeline.

Yes

No

Will the proposed modification affect or lead to licensure or certification? If yes, identify the licensure or certification.

Yes

No

Explain how the program will prepare students for this licensure or certification.

If the program is an Educator Preparation Program, does the proposed certification area require national recognition from a Specialized Professional Association (SPA)? If yes, describe the institution's plans to seek national recognition, including the expected timeline.

Yes

No

Appendix

~~Blue~~ means deleted from the program
~~Red~~ means added to the program

Degree Requirements (120 Credits)

Core Curriculum Requirements

Core Curriculum (38-40 Total Credit Hours)

Graduation Requirements

Graduation Requirements (3-7+ Credits) *

Foundation Courses (~~23-29~~ 13-17 Credits) *

Complete the following courses:

- ~~STAT 201~~ – ~~Introductory Statistics*~~ (3 credits) AND
- ~~STAT 201L~~ – ~~Introductory Statistics Laboratory*~~ (1 credit)
- CSCI 140 - Introduction to Algorithmic Design I (3 credits) AND
- CSCI 140L - Introduction to Algorithmic Design I Laboratory (1 credit)
- MATH 160 - Calculus I (4 credits) *
- MATH 161 - Calculus II (4 credits)
- MATH 190 - Freshman Seminar in Mathematics (1 credit)
- ~~MATH 242~~ – ~~Modeling for Scientists I~~ (3 credits) AND
- ~~MATH 242L~~ – ~~Modeling for Scientists I Laboratory~~ (1 credit)
- ~~PHYS 211~~ – ~~Essentials of Physics I~~ (3 credits) AND
- ~~PHYS 211L~~ – ~~Essentials of Physics I Laboratory~~ (1 credit)

~~Choose two additional courses:~~

- ~~Two science courses from either BIOL, CHEM, GEOL, MSCI, or PHYS** with course numbers greater than 109~~

Note:

* Course credit hours only count once toward the total university graduation credit hour requirements. Click on **Credit Sharing** for more information.

** ~~PHYS 205 may not be counted towards this requirement.~~

Major Requirements (~~37~~ 19 Credits)

Complete the following courses:

- MATH 220 - Mathematical Proofs and Problem Solving (3 credits)
- MATH 260 - Calculus III (4 credits)
- MATH 320 - Elementary Differential Equations (3 credits)
- MATH 344 - Linear Algebra (3 credits)
- ~~MATH 450 - Advanced Calculus I (3 credits)~~
- MATH 490 - Seminar in Mathematics (3 credits)
- STAT 412 - Statistical Inference I (3 credits)

~~Choose one course from the following:~~

- ~~MATH 446 - Abstract Algebra (3 credits)~~
- ~~MATH 454 - Advanced Calculus II (3 credits)~~

~~Choose two courses from the following:~~

- ~~MATH or STAT courses numbered 300 or above (except MATH 330)~~

~~Choose two courses from the following:~~

- ~~MATH or STAT courses numbered 400 or above~~

Concentration 1 (21 credits)

For students who are interested in a career in K-12 education

- MATH 331 – Foundation of Geometry (3 credits)
- MATH 384 – Functions, Applications, and Chaos (3 credits)
- MATH 446 – Abstract Algebra
- MATH 450 – Advanced Calculus I (3 credits) OR
- MATH 452 – Complex Variables (3 credits)

Choose two MATH or STAT courses numbered 300 or above

Choose one MATH or STAT course numbered 400 or above

Concentration 2 (22 credits)

For students who are interested in graduate school and/or a career in industry

- MATH 242 - Modeling for Scientists I (3 credits) AND
- MATH 242L - Modeling for Scientists I (1 credit) Laboratory
- MATH 450 – Advanced Calculus I (3 credits)
- MATH 454 – Advanced Calculus II (3 credits) OR

- MATH 446 – Abstract Algebra (3 credits)

Choose two MATH or STAT courses numbered 300 or above (except MATH 330, MATH 331, and MATH 384)

Choose two MATH or STAT course numbered 400 or above

Cognate Requirements (9 Credits)

Mathematics majors will select an interdisciplinary cognate of upper level courses numbered 300 or above with the approval of their faculty adviser. A grade of ‘C’ or better is required in each course to be applied toward the cognate. A minor will fulfill this requirement.

Electives (~~0-18~~ 7-17 Credits)

Total Credits Required: 120