RADFORD UNIVERSITY
Academic Affairs

Cover Sheet for New Undergraduate Curriculum Proposals

Date: 9/16/2020

Department: Mathematics and Statistics

Current Course or Program ID: BA in Mathematics

Proposal Number:
(Assigned by the Registrar)

Contact Person: Eric Choate

Proposal Category: (✓ all that apply). A separate cover sheet must be submitted for each proposal.

____ Course Prerequisite Change	____ Change to Catalog Description
____ Course Title Change	____ Minor Change to Course
____ Course Deletion	____ New Course
____ Course Number Change	__x__ Program Revision
____ Course Credit Hour Change	____ New or Discontinued Program (Major, minor, or certificate)
____ Course Syllabus Change	

Other Proposal Requirements: (✓ as applies and attach form)

____	For New Course Proposals, attach the New Course Proposal.
____	For New or Discontinued Majors or Certificates, or significant changes in program requirements contact the SCHEV liaison, the Assistant Provost for Academic Operations, to compose and attach the proposal in SCHEV format.

Proposal Description with Rationale: For changes in catalog entries or syllabi, include the current language and use track changes to indicate proposed changes. Explain why the change is desired.

This proposal changes the applied mathematics concentration in two ways.

1. Last year, we created a new course MATH 261 as part of a restructuring of the Numerical Analysis sequence with the intent that it would become a prerequisite for MATH 434 in the 2021-22 catalog. When this goes into effect, MATH 261 becomes a hidden requirement for the applied mathematics concentration, and so we need to make this requirement explicit.

2. When we updated the list of electives that the applied mathematics concentration requires, we inadvertently omitted astronomy courses and CHEM 112.

Effective Date: immediately
Reason for requesting an alternative effective date:

Revision of Existing Program

Contrast the current program with the proposed program, including credits required for the degree. Make sure all changes are noted. Attach additional sheets if necessary.

Existing Program:	Proposed Program:

Mathematics, B.A.
 	
Concentrations
 	
Applied Mathematics Concentration (25 credits)
 	
• MATH 346 - Differential Equations
• MATH 434 - Numerical Analysis I
• MATH 435 - Numerical Analysis II
• STAT 302 - Probability and Statistics II
• PHYS 221 – Physics
 	
Additional Requirements
• ENGL 306 - Professional Writing
• Six credits chosen from the following:
  ○ MATH 280 or any 300- or 400-level mathematics or statistics course
  ○ Any ITEC course numbered 200 or above, with the exception of ITEC 200, 202, or ITEC 281
  ○ PHYS 222 or any physics course numbered 300 or above
  ○ Any chemistry course numbered 200 or above
  ○ GEOS 250 or 380
  ○ Other courses approved by the department
	Mathematics, B.A.
	
	Concentrations
	
	Applied Mathematics Concentration (26 credits)
	
	• MATH 261 – Linear Algebra Computer Lab
	• MATH 346 - Differential Equations
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Approval/Recommendation Signature Sheet for Undergraduate Curriculum Proposals

Signature	Title	Date
	Department Curriculum Committee Chair	
	Department Chair (on behalf of faculty)	
	College Curriculum Committee Chair	
	College Dean	
For courses proposed to be included in the Core Curriculum:		
	Core Curriculum Advisory Committee Chair	
For new majors and certificates:		
	Library Liaison	
For new or discontinued majors, minors, certificates, concentrations, options or significant changes in program requirements:		
	Faculty Senate President following review by the Faculty Senate	
	Provost and VP for Academic Affairs	
For proposals going to BOV, SCHEV and/or SACSCOC:		
	President	
	Board of Visitors approval date	
	SCHEV approval date	
	SACSCOC approval date	
	Entered into catalog by Registrar's Office	

01/14/2020

REAL Curriculum Program Alignment Proposal

Department or School: Mathematics and Statistics Date: 9/15/2020

Degree type: ☐BS ☒BA ☐BBA ☐BSN ☐BM ☐BFA ☐BSW ☐Minor ☐Certificate

Program: BA in Mathematics, statistics concentration

REAL Area Program Designation Sought (check all that apply): ☒ R ☐ E ☐ A ☒ L

Dept/School Contact: Eric Choate (echoate2@radford.edu)

BS/BA Requirements: BA language requirement

- Any degree program that fulfills a REAL area must include at least 9 unique credit hours for each area covered. At least 3 of these 9 credit hours must be at the 300 level or above
- A single major degree program may fulfill no more than three REAL areas for any one student, unless all four REAL areas are fulfilled by accreditation or licensure requirements.
- A single minor or certificate degree program may fulfill no more than two REAL areas.
- Degree program may cover up to two REAL areas using a single prefix.
- All courses documenting the coverage of a REAL area must fulfill all learning outcomes and be designated in that area.
- All courses that document fulfillment of a REAL area within a degree program of study are NOT required to be taught by the department/school. However, departments/schools are expected to formally communicate with other departments about reliance on and inclusion of courses in their degree program plans of study. Indicate this through signature of chair or director of the partnering department or school in the areas below.
- Departments or schools that seek to fulfill REAL areas must acknowledge assessment requirements for those areas. Assessment of degree seeking students is required to be conducted yearly by the department or school offering the degree program.
- If departments or schools want to use a menu of courses to fulfill a particular area, please duplicate the sections below for each REAL area and include information for each course included in the menu of options.
- Please save this file for submission as PROGRAM NAME_ProgramType.docx (Example: Criminal Justice_BS.docx)

By signing, the department/school acknowledges the above conditions and considerations:

Dept/School Signature	Date:

Official Program Description: (This is a revision passed in April 2020.)

Mathematics, B.A.

The major is available with a choice of three concentrations: Applied Mathematics, Statistics, and Traditional Mathematics. Students who wish to pursue secondary education licensure in mathematics are advised to choose the Traditional Mathematics concentration.

B.A. Requirements
The Bachelor of Arts degree requires completion of the B.A. language requirements described here in this catalog.

Major Core Courses (30-32 credits)
All majors in mathematics must take:

- One of:
  - MATH 171 - Calculus and Analytic Geometry I
  - MATH 169 - Calculus I with Integrated Precalculus II
- MATH 172 - Calculus and Analytic Geometry II
- MATH 271 - Calculus and Analytic Geometry III
- MATH 260 - Introductory Linear Algebra
- MATH 300 - Mathematical Foundations
- MATH 430 - Advanced Calculus I
- MATH 431 - Advanced Calculus II
- STAT 301 - Probability and Statistics I
- One of:
  - ITEC 109 - Problem Solving and Programming
  - ITEC 120 - Principles of Computer Science I

Notes:
A grade of at least a "C" is required in MATH 172 and 271. Any departmental majors receiving credit for MATH 271 cannot subsequently receive credit for any 100-level mathematics course unless the course is required for their concentration.

Concentrations

Applied Mathematics Concentration (25 credits)

[Omitted]

Statistics Concentration (18 credits)

- STAT 302 - Probability and Statistics II
- STAT 420 - Modern Regression Analysis
- STAT 421 - Design of Experiments
- Three credits of 300- or 400-level statistics courses.

Additional Requirements

- ENGL 306 - Professional Writing
- Three credits chosen from the following:
  - Any 300- or 400-level statistics or mathematics courses
  - ANSC 303 – Quantitative and Computer Methods in Anthropology
  - CRJU 385 – Research Methods in Criminal Justice
  - ECON 321 – Econometrics
  - GEOS 250 – Introduction to GIS
  - GEOS 380 – Spatial Analysis Techniques
  - ITEC 375 – Data Science
  - MGNT 333 - Business Analytics for Decision Making
  - MGNT 357 – Operations Management

- PSYC 301 - Analysis of Psychological Data
- PSYC 302 - Research Methods in Psychology
- SOCY 380 Introduction to Social Research Methods
- Any biology course
- Any chemistry course
- Other courses approved by the department

Traditional Mathematics Concentration (18 credits)
[Omitted]

Electives

Students should consult with their academic advisors in selecting elective courses to complete the 120 semester hours required for graduation.

Total Credits Needed for Degree 120

SCIENTIFIC AND QUANTITATIVE REASONING

R Area: Course Prefix: MATH Course Number: 171 Course Title: Calculus and Analytic Geometry I Credit Hours: 4 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 85-100	Is this course required or an elective for your degree program? ☐ Required ☒ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Area: Course Prefix: MATH Course Number: 169 Course Title: Calculus I with Integrated Precalculus II Credit Hours: 3 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 60-75	Is this course required or an elective for your degree program? ☐ Required ☒ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Area: Course Prefix: MATH Course Number: 172 Course Title: Credit Hours: New course: ☐ Yes ☐ No Revised course: ☐ Yes ☐ No Projected student enrollment per academic year: 50-75	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Area: Course Prefix: STAT Course Number: 301 Course Title: Probability and Statistics I Credit Hours: 4 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 30-40	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Designated Course Required within the Program of Study Approved for Inclusion in the General Education Coursework: MATH 171 or 169	

R Area: Learning Goal: To apply scientific and quantitative reasoning to questions about the natural world, mathematics, or related areas.	
Learning Outcome 1: Students apply scientific and quantitative information to test problems and draw conclusions.	Quantitative Measure: Students will take the quantitative measure created for the REAL Studies R minor. Scientific Measure: Students will take the scientific measure created for the REAL Studies R minor.

Learning Outcome 2: Students evaluate the quality of data, methods, or inferences used to generate scientific and quantitative knowledge.	Quantitative Measure: Students will take the quantitative measure created for the REAL Studies R minor. Scientific Measure: Students will take the scientific measure created for the REAL Studies R minor.
Additional information for REAL Council consideration: The assessment plan for R is the same as the plan approved by the REAL Council for the BS in Mathematics, traditional mathematics concentration.	

APPLIED LEARNING

L Area: Course Prefix: STAT Course Number: 302 Course Title: Probability and Statistics II Credit Hours 3: New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 15	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
L Area: Course Prefix: STAT Course Number: 421 Course Title: Design of Experiments Credit Hours:3 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year:	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
L Area: Course Prefix: ENGL Course Number: 306 Course Title: Professional Writing Credit Hours 3: New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year:	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☐ Yes ☒ No If no, collaborating dept/school must also complete the remaining elements, and must sign below. Course Rotation: ☒ Fall ☒ Spring ☒ Intersession ☐ Other (Explain below) Intended Frequency: ☒ Every academic year ☐ Every semester ☐ Every other year ☐ At least once every three years ☐ Other Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if not offered in dept/school: See attached email.

L Area: Learning Goal: To explore professional practice through the application of knowledge, skills, and critical reflection.	
Learning Outcome 1: Students apply acquired knowledge and skills to develop professional identity or professional practice.	Students will take the two measures created for the REAL Studies L minor

Learning Outcome 2: Students critically reflect on their learning, abilities, experiences, or role within professional contexts.	Students will take the two measures created for the REAL Studies L minor.
Additional information for REAL Council consideration:	

Are existing material resources adequate to support this program alignment proposal?
☒ Yes ☐ No If not, what additional material resources would be needed?

Are existing space resources adequate to support this program alignment proposal?
☒ Yes ☐ No If not, what additional space resources would be needed?

Are existing human resources adequate to support this program alignment proposal?
☒ Yes ☐ No If not, what additional human resources would be needed?

Department Curriculum Committee Recommendation:	Signature:	Date:
Chair/Dean on Behalf of Dept/School:	Signature:	Date:
College Curriculum Committee Approval:	Signature:	Date:
Dean/AVP Approval:	Signature:	Date:
REAL Council Recommendation:	Signature:	Date:
Faculty Senate Curriculum Committee Recommendation:	Signature:	Date:
Faculty Senate Approval:	Signature:	Date:
Provost Approval:	Signature:	Date:

01/14/2020

REAL Curriculum Program Alignment Proposal

Department or School: Mathematics and Statistics Date: 9/15/2020

Degree type: ☐BS ☒BA ☐BBA ☐BSN ☐BM ☐BFA ☐BSW ☐Minor ☐Certificate

Program: BS in Mathematics, Applied Mathematics concentration

REAL Area Program Designation Sought (check all that apply): ☒ R ☐ E ☐ A ☒ L

Dept/School Contact: Eric Choate (echoate2@radford.edu)

BS/BA Requirements: BA language requirement

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Notes:
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Concentrations

Applied Mathematics Concentration (26 credits)

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- STAT 302 - Probability and Statistics II
- PHYS 221 – Physics

Additional Requirements

- ENGL 306 - Professional Writing
- Six credits chosen from the following:
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  - Any physics course numbered 300 or above
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  - Any astronomy course
  - GEOS 250 or 380
  - Other courses approved by the department

Statistics Concentration (18 credits)
[Omitted]

Traditional Mathematics Concentration (18 credits)
[Omitted]

Electives

Students should consult with their academic advisors in selecting elective courses to complete the 120 semester hours required for graduation.

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Provost Approval:	Signature:	Date:

RADFORD UNIVERSITY
Academic Affairs

Cover Sheet for New Undergraduate Curriculum Proposals

Date: 9/16/2020

Department: Mathematics and Statistics

Current Course or Program ID: BS in Mathematics

Proposal Number:
(Assigned by the Registrar)

Contact Person: Eric Choate

Proposal Category: (✓ all that apply). A separate cover sheet must be submitted for each proposal.

____ Course Prerequisite Change	____ Change to Catalog Description
____ Course Title Change	____ Minor Change to Course
____ Course Deletion	____ New Course
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____ Course Credit Hour Change	____ New or Discontinued Program (Major, minor, or certificate)
____ Course Syllabus Change	

Other Proposal Requirements: (✓ as applies and attach form)

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Effective Date: immediately
Reason for requesting an alternative effective date:

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Contrast the current program with the proposed program, including credits required for the degree. Make sure all changes are noted. Attach additional sheets if necessary.

Existing Program:	Proposed Program:

Mathematics, B.S.
 	
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Applied Mathematics Concentration (25 credits)
 	
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• MATH 434 - Numerical Analysis I
• MATH 435 - Numerical Analysis II
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Additional Requirements
• ENGL 306 - Professional Writing
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  ○ Any ITEC course numbered 200 or above, with the exception of ITEC 200, 202, or ITEC 281
  ○ Any physics course numbered 300 or above
  ○ Any chemistry course numbered 200 or above
  ○ GEOS 250 or 380
  ○ Other courses approved by the department
 	
B.S. Requirements (7 credits)
• PHYS 222 – Physics
• Three credits in
  ○ Any physics course numbered 300 or above
  ○ Any astronomy course
  ○ Any biology course
  ○ Any chemistry course
  ○ Any geology course
  ○ GEOS 130 – Physical Geography
	Mathematics, B.S.
	
	Concentrations
	
	Applied Mathematics Concentration (26 credits)
	
	• MATH 261 – Linear Algebra Computer Lab
	• MATH 346 - Differential Equations
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	• Three credits in
	  ○ Any physics course numbered 300 or above
	  ○ Any astronomy course
	  ○ Any biology course
	  ○ Any chemistry course
	  ○ Any geology course
	  ○ GEOS 130 – Physical Geography

Approval/Recommendation Signature Sheet for Undergraduate Curriculum Proposals

Signature	Title	Date
	Department Curriculum Committee Chair	
	Department Chair (on behalf of faculty)	
	College Curriculum Committee Chair	
	College Dean	
For courses proposed to be included in the Core Curriculum:		
	Core Curriculum Advisory Committee Chair	
For new majors and certificates:		
	Library Liaison	
For new or discontinued majors, minors, certificates, concentrations, options or significant changes in program requirements:		
	Faculty Senate President following review by the Faculty Senate	
	Provost and VP for Academic Affairs	
For proposals going to BOV, SCHEV and/or SACSCOC:		
	President	
	Board of Visitors approval date	
	SCHEV approval date	
	SACSCOC approval date	
	Entered into catalog by Registrar's Office	

01/14/2020

REAL Curriculum Program Alignment Proposal

Department or School: Mathematics and Statistics Date: 9/15/2020

Degree type: ☒BS ☐BA ☐BBA ☐BSN ☐BM ☐BFA ☐BSW ☐Minor ☐Certificate

Program: BS in Mathematics, statistics concentration

REAL Area Program Designation Sought (check all that apply): ☒ R ☐ E ☐ A ☒ L

Dept/School Contact: Eric Choate (echoate2@radford.edu)

BS/BA Requirements: See below

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- Departments or schools that seek to fulfill REAL areas must acknowledge assessment requirements for those areas. Assessment of degree seeking students is required to be conducted yearly by the department or school offering the degree program.
- If departments or schools want to use a menu of courses to fulfill a particular area, please duplicate the sections below for each REAL area and include information for each course included in the menu of options.
- Please save this file for submission as PROGRAM NAME_ProgramType.docx (Example: Criminal Justice_BS.docx)

By signing, the department/school acknowledges the above conditions and considerations:

Dept/School Signature	Date:

Official Program Description: (This is a revision passed in April 2020.)

Mathematics, B.S.

The major is available with a choice of three concentrations: Applied Mathematics, Statistics, and Traditional Mathematics. Students who wish to pursue secondary education licensure in mathematics are advised to choose the Traditional Mathematics concentration.

B.S. Requirements
B.S. requirements are listed with the respective concentrations.

Major Core Courses (30-32 credits)
All majors in mathematics must take:

- One of:
  - MATH 171 - Calculus and Analytic Geometry I
  - MATH 169 - Calculus I with Integrated Precalculus II
- MATH 172 - Calculus and Analytic Geometry II
- MATH 271 - Calculus and Analytic Geometry III
- MATH 260 - Introductory Linear Algebra
- MATH 300 - Mathematical Foundations
- MATH 430 - Advanced Calculus I
- MATH 431 - Advanced Calculus II
- STAT 301 - Probability and Statistics I
- One of:
  - ITEC 109 - Problem Solving and Programming
  - ITEC 120 - Principles of Computer Science I

Notes:
A grade of at least a "C" is required in MATH 172 and 271. Any departmental majors receiving credit for MATH 271 cannot subsequently receive credit for any 100-level mathematics course unless the course is required for their concentration.

Concentrations

Applied Mathematics Concentration (25 credits)

[Omitted]

Statistics Concentration (18 credits)

- STAT 302 - Probability and Statistics II
- STAT 420 - Modern Regression Analysis
- STAT 421 - Design of Experiments
- Three credits of 300- or 400-level statistics courses.

Additional Requirements

- ENGL 306 - Professional Writing
- Three credits chosen from the following:
  - Any 300- or 400-level statistics or mathematics courses
  - ANSC 303 – Quantitative and Computer Methods in Anthropology
  - CRJU 385 – Research Methods in Criminal Justice
  - ECON 321 – Econometrics
  - GEOS 250 – Introduction to GIS
  - GEOS 380 – Spatial Analysis Techniques
  - ITEC 375 – Data Science
  - MGNT 333 - Business Analytics for Decision Making
  - MGNT 357 – Operations Management
  - PSYC 301 - Analysis of Psychological Data

- PSYC 302 - Research Methods in Psychology
- SOCY 380 Introduction to Social Research Methods
- Any biology course
- Any chemistry course
- Other courses approved by the department

B.S. Requirements (6 credits)

- Three credits in
  - PHYS 221
  - Any astronomy course
  - Any biology course
  - Any chemistry course
  - Any geology course
  - GEOS 130 – Physical Geography
- Three credits chosen from the following:
  - ANSC 303 – Quantitative and Computer Methods in Anthropology
  - CRJU 385 – Research Methods in Criminal Justice
  - ECON 321 – Econometrics
  - GEOS 250 – Introduction to GIS
  - GEOS 380 – Spatial Analysis Techniques
  - ITEC 375 – Data Science
  - MGNT 333 - Business Analytics for Decision Making
  - MGNT 357 – Operations Management
  - PSYC 301 - Analysis of Psychological Data
  - PSYC 302 - Research Methods in Psychology
  - SOCY 380 Introduction to Social Research Methods
  - PHYS 222
  - Any biology course
  - Any chemistry course
  - Other courses approved by the department

Traditional Mathematics Concentration (18 credits)

[Omitted]

Electives

Students should consult with their academic advisors in selecting elective courses to complete the 120 semester hours required for graduation.

Total Credits Needed for Degree 120

SCIENTIFIC AND QUANTITATIVE REASONING

R Area: Course Prefix: MATH Course Number: 171 Course Title: Calculus and Analytic Geometry I Credit Hours: 4 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 85-100	Is this course required or an elective for your degree program? ☐ Required ☒ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Area: Course Prefix: MATH Course Number: 169 Course Title: Calculus I with Integrated Precalculus II Credit Hours: 3 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 60-75	Is this course required or an elective for your degree program? ☐ Required ☒ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Area: Course Prefix: MATH Course Number: 172 Course Title: Credit Hours: New course: ☐ Yes ☐ No Revised course: ☐ Yes ☐ No Projected student enrollment per academic year: 50-75	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Area: Course Prefix: STAT Course Number: 301 Course Title: Probability and Statistics I Credit Hours: 4 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 30-40	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
R Designated Course Required within the Program of Study Approved for Inclusion in the General Education Coursework: MATH 171 or 169	

R Area: Learning Goal: To apply scientific and quantitative reasoning to questions about the natural world, mathematics, or related areas.	
Learning Outcome 1: Students apply scientific and quantitative information to test problems and draw conclusions.	Quantitative Measure: Students will take the quantitative measure created for the REAL Studies R minor. Scientific Measure: Students will take the scientific measure created for the REAL Studies R minor.

Learning Outcome 2: Students evaluate the quality of data, methods, or inferences used to generate scientific and quantitative knowledge.	Quantitative Measure: Students will take the quantitative measure created for the REAL Studies R minor. Scientific Measure: Students will take the scientific measure created for the REAL Studies R minor.
Additional information for REAL Council consideration: The assessment plan for R is the same as the plan approved by the REAL Council for the BS in Mathematics, traditional mathematics concentration.	

APPLIED LEARNING

L Area: Course Prefix: STAT Course Number: 302 Course Title: Probability and Statistics II Credit Hours 3: New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 15	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
L Area: Course Prefix: STAT Course Number: 421 Course Title: Design of Experiments Credit Hours:3 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year:	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
L Area: Course Prefix: ENGL Course Number: 306 Course Title: Professional Writing Credit Hours 3: New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year:	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☐ Yes ☒ No If no, collaborating dept/school must also complete the remaining elements, and must sign below. Course Rotation: ☒ Fall ☒ Spring ☒ Intersession ☐ Other (Explain below) Intended Frequency: ☒ Every academic year ☐ Every semester ☐ Every other year ☐ At least once every three years ☐ Other Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if not offered in dept/school: See attached email.

L Area: Learning Goal: To explore professional practice through the application of knowledge, skills, and critical reflection.	
Learning Outcome 1: Students apply acquired knowledge and skills to develop professional identity or professional practice.	Students will take the two measures created for the REAL Studies L minor

Learning Outcome 2: Students critically reflect on their learning, abilities, experiences, or role within professional contexts.	Students will take the two measures created for the REAL Studies L minor.
Additional information for REAL Council consideration:	

Are existing material resources adequate to support this program alignment proposal?
☒ Yes ☐ No If not, what additional material resources would be needed?

Are existing space resources adequate to support this program alignment proposal?
☒ Yes ☐ No If not, what additional space resources would be needed?

Are existing human resources adequate to support this program alignment proposal?
☒ Yes ☐ No If not, what additional human resources would be needed?

Department Curriculum Committee Recommendation:	Signature:	Date:
Chair/Dean on Behalf of Dept/School:	Signature:	Date:
College Curriculum Committee Approval:	Signature:	Date:
Dean/AVP Approval:	Signature:	Date:
REAL Council Recommendation:	Signature:	Date:
Faculty Senate Curriculum Committee Recommendation:	Signature:	Date:
Faculty Senate Approval:	Signature:	Date:
Provost Approval:	Signature:	Date:

01/14/2020

REAL Curriculum Program Alignment Proposal

Department or School: Mathematics and Statistics Date: 9/15/2020

Degree type: ☒BS ☐BA ☐BBA ☐BSN ☐BM ☐BFA ☐BSW ☐Minor ☐Certificate

Program: BS in Mathematics, Applied Mathematics concentration

REAL Area Program Designation Sought (check all that apply): ☒ R ☐ E ☐ A ☒ L

Dept/School Contact: Eric Choate (echoate2@radford.edu)

BS/BA Requirements: See below

- Any degree program that fulfills a REAL area must include at least 9 unique credit hours for each area covered. At least 3 of these 9 credit hours must be at the 300 level or above
- A single major degree program may fulfill no more than three REAL areas for any one student, unless all four REAL areas are fulfilled by accreditation or licensure requirements.
- A single minor or certificate degree program may fulfill no more than two REAL areas.
- Degree program may cover up to two REAL areas using a single prefix.
- All courses documenting the coverage of a REAL area must fulfill all learning outcomes and be designated in that area.
- All courses that document fulfillment of a REAL area within a degree program of study are NOT required to be taught by the department/school. However, departments/schools are expected to formally communicate with other departments about reliance on and inclusion of courses in their degree program plans of study. Indicate this through signature of chair or director of the partnering department or school in the areas below.
- Departments or schools that seek to fulfill REAL areas must acknowledge assessment requirements for those areas. Assessment of degree seeking students is required to be conducted yearly by the department or school offering the degree program.
- If departments or schools want to use a menu of courses to fulfill a particular area, please duplicate the sections below for each REAL area and include information for each course included in the menu of options.
- Please save this file for submission as PROGRAM NAME_ProgramType.docx (Example: Criminal Justice_BS.docx)

By signing, the department/school acknowledges the above conditions and considerations:

Dept/School Signature	Date:

Official Program Description: (This is a revision passed in September 2020.)

Mathematics, B.S.

The major is available with a choice of three concentrations: Applied Mathematics, Statistics, and Traditional Mathematics. Students who wish to pursue secondary education licensure in mathematics are advised to choose the Traditional Mathematics concentration.

B.S. Requirements
B.S. requirements are listed with the respective concentrations.

Major Core Courses (30-32 credits)
All majors in mathematics must take:

- One of:
  - MATH 171 - Calculus and Analytic Geometry I
  - MATH 169 - Calculus I with Integrated Precalculus II
- MATH 172 - Calculus and Analytic Geometry II
- MATH 271 - Calculus and Analytic Geometry III
- MATH 260 - Introductory Linear Algebra
- MATH 300 - Mathematical Foundations
- MATH 430 - Advanced Calculus I
- MATH 431 - Advanced Calculus II
- STAT 301 - Probability and Statistics I
- One of:
  - ITEC 109 - Problem Solving and Programming
  - ITEC 120 - Principles of Computer Science I

Notes:
A grade of at least a "C" is required in MATH 172 and 271. Any departmental majors receiving credit for MATH 271 cannot subsequently receive credit for any 100-level mathematics course unless the course is required for their concentration.

Concentrations

Applied Mathematics Concentration (26 credits)

- MATH 261 – Linear Algebra Computer Lab
- MATH 346 - Differential Equations
- MATH 434 - Numerical Analysis I
- MATH 435 - Numerical Analysis II
- STAT 302 - Probability and Statistics II
- PHYS 221 – Physics

Additional Requirements

- ENGL 306 - Professional Writing
- Six credits chosen from the following:
  - MATH 280 or any 300- or 400-level mathematics or statistics course
  - Any ITEC course numbered 200 or above, with the exception of ITEC 200, 202, or ITEC 281
  - Any physics course numbered 300 or above
  - Any chemistry course
  - Any astronomy course
  - GEOS 250 or 380
  - Other courses approved by the department

B.S. Requirements (7 credits)

- PHYS 222 – Physics
- Three credits in

- Any physics course numbered 300 or above
- Any astronomy course
- Any biology course
- Any chemistry course
- Any geology course
- GEOS 130 – Physical Geography

Statistics Concentration (18 credits)
[Omitted]

Traditional Mathematics Concentration (18 credits)
[Omitted]

Electives

Students should consult with their academic advisors in selecting elective courses to complete the 120 semester hours required for graduation.

Total Credits Needed for Degree 120

SCIENTIFIC AND QUANTITATIVE REASONING

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R Area: Course Prefix: MATH Course Number: 169 Course Title: Calculus I with Integrated Precalculus II Credit Hours: 3 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 60-75	Is this course required or an elective for your degree program? ☐ Required ☒ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
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APPLIED LEARNING

L Area: Course Prefix: STAT Course Number: 302 Course Title: Probability and Statistics II Credit Hours 3: New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year: 15	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
L Area: Course Prefix: MATH Course Number: 435 Course Title: Numerical Analysis II Credit Hours:3 New course: ☐ Yes ☒ No Revised course: ☐ Yes ☒ No Projected student enrollment per academic year:	Is this course required or an elective for your degree program? ☒ Required ☐ Elective Is this course offered within your dept/school? ☒ Yes ☐ No
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Department Curriculum Committee Recommendation:	Signature:	Date:
Chair/Dean on Behalf of Dept/School:	Signature:	Date:
College Curriculum Committee Approval:	Signature:	Date:
Dean/AVP Approval:	Signature:	Date:
REAL Council Recommendation:	Signature:	Date:
Faculty Senate Curriculum Committee Recommendation:	Signature:	Date:
Faculty Senate Approval:	Signature:	Date:
Provost Approval:	Signature:	Date: